



Sub-Saharan Africa Oil and Gas:

Opportunities for Manufacturing Suppliers

London Research International



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ISBN: 978-0-9567284-0-1

© 2014 London Research International Ltd., London, UK

May 2014. Published in the United Kingdom by
London Research International Ltd.
Elizabeth House, 39 York Road, London, SE1 7NQ, United Kingdom
Tel: +44 (0)20 7378 7300 Fax: +44 (0)20 7183 1899
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Company Registration: 5004849 (England & Wales) Registered at the company address.

VAT Registration: 839 504 312

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List of Abbreviations

APPAA	African Petroleum Producers Association
bbl/d	Barrels per day
bcf	Billion cubic feet
bcm	Billion cubic metres
BRIC	Brazil, Russia, India and China
CABGOC	Cabinda Gulf Oil Company (Angola)
CNOOC	China National Offshore Oil Corporation
DPR	Department of Petroleum Resources (Nigeria)
US EIA	United States Energy Information Administration
EITI	Extractive Industries Transparency Initiative

ENH	Empresa Nacional de Hidrocarbonetos (Mozambique)
EPC	Engineering, procurement and construction
FDI	Foreign direct investment
FEED	Front end engineering design
FPSO	Floating Production Storage and Offloading
GDP	Gross domestic product
GNPC	Ghana National Petroleum Company
IMF	International Monetary Fund
IOC	International oil company
JV	Joint Venture
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
Mbbl	Thousand barrels
MHI	Mitsubishi Heavy Industries
MMbbl	Million barrels
MMcf	Million cubic feet
Mtpa	Thousand metric tons per annum
MMtpa	Million metric tons per annum
MoU	Memorandum of Understanding
MPN	Mobil Producing Nigeria
MPSA	Model Production Sharing Agreement (Tanzania)
NEITI	Nigerian Extractive Industries Transparency Initiative
NIPP	National Integrated Power Project (Nigeria)
NNPC	Nigerian National Petroleum Company
OML	Oil Mining Lease
OPEC	Organization of Petroleum Exporting Countries
PIB	Petroleum Industry Bill (Nigeria)
PSC	Production Sharing Contract
SPDC	Shell Petroleum Development Company
SNG	Shell Nigeria Gas Ltd
tcf	Trillion cubic feet
tpa	Metric tons per annum
TEN	Tweneboa, Enyenra and Ntomme (Ghana)
TPDC	Tanzania Petroleum Development Corporation
TNP	Trans-Nigeria Pipeline
TSGP	Trans-Saharan Gas Pipeline
VLCC	Very Large Container Carrier
WAGP	West African Gas Pipeline

1. Introduction

Sub-Saharan Africa is becoming increasingly important for the global oil and gas sector. The region's share in the global oil and gas reserve and production is now approximately 10 per cent. Many of the recent major discoveries of oil and gas reserves occurred in sub-Saharan Africa, such as the Nigeria's Agbami Oilfield and Ghana's Jubilee Field, and with further discoveries expected, the importance of Sub-Saharan Africa to the sector is growing.

Increased oil exports from sub-Saharan Africa are having an impact on the global supply and demand balance of oil, especially with regard to China. Liquefied Natural Gas (LNG) exports, particularly from Mozambique and Tanzania, are expected to have a significant impact on the global gas market, including the LNG prices in the Asia-Pacific region in the future. It is likely to increase the global supply in the spot gas market and, as a result, lower the price differentiation between the regional gas markets.

Despite government corruption and security issues in many of the sub-Saharan African countries, a number of international companies are involved in the operation and concession of the oil and gas sector in the region. As more and more drilling blocks are put up for concession, there remain significant opportunities for international oil and gas companies involved in the upstream of the sector. However, the aforementioned risks combined with the absence of capable local contractors and suppliers, as well as inadequate infrastructure and local industries, all contribute to the lack of investment in the mid- and downstream value chain of oil and gas as of yet. A large portion of crude oil is exported, and associated gas extracted is widely flared. Hence, the growth of upstream gas and further opportunities are to be expected regarding the development of the domestic African oil and gas markets and the associated midstream and downstream infrastructure.

Governments are trying to make the best use of the upstream activities to create and develop relevant industries whilst providing jobs for the domestic population, building the infrastructure and pushing forward human development. Some governments have established or are in the process of enacting local content laws to attain that goal. However, local contractors or suppliers often lack the experience and skills required. As a result, the local content laws are often viewed as an obstacle to further development of hydrocarbon resources by operators of oil and gas fields. Those operators are trying to develop the capability of local contractors and suppliers by providing training, favourable contractual conditions and other support. However, the difficulty lies in obtaining experienced professionals in a region in which the oil and gas sector is in its infancy. Any decision to enter the oil and gas sector in sub-Saharan Africa involves large risks for potentially large gains, demanding flexibility through extensive contingency planning paired with a long-term commitment to the region.

1.1 Opportunities for international manufacturers

Africa is said to be the last frontier for international companies. For international suppliers including plant manufacturers, opportunities are abundant in many sectors of the economy in Africa. The mineral sector is growing faster than that of any other region of the world. The rapid growth requires the provision of drilling, power and transport equipment and systems. Low electrification rates among villages and households, and

urban traffic congestion results in strong demand for power and urban rail systems, respectively. Furthermore, as consumer spending power increases, more factories with machineries and automation systems are built by consumer product companies, providing business opportunities for international suppliers.

However, it is still the oil and gas sector that has been attracting the greatest proportion of foreign direct investment (FDI) into the region, demonstrating how important the sector is for international suppliers. Tens of billions of dollars are spent for upstream capital and operating expenditures in Africa every year. As more discoveries of oil and gas are expected, and as continuous increase in production levels is expected to match the levels of proven reserves, the sector will provide sustained opportunities for international suppliers.

As with International Oil Companies (IOCs), perceived risks are high for international suppliers. The local content laws practically require international suppliers to have a local partner. Further, regardless of the law, a local presence is essential to do business in Africa. Challenges often mentioned by international suppliers include recruitment, security and integrity. Issues of integrity cover compliance, bribery, corruption and counterfeit products. Without a good local representative and local partner, those challenges cannot be overcome. In this respect, international suppliers must invest in local human resources, and to do so, they must make a long-term commitment to the country.

In recent years, large engineering groups such as Siemens and ABB started deploying offices and production bases in the region. They are witnessing a surge of orders in the oil and gas and power sectors. Plant and heavy equipment suppliers operating in sub-Saharan Africa have already been the recipients of lucrative contracts. By committing to the region, opportunities for international suppliers are likely to increase exponentially as the oil and gas sector develops and related projects are commissioned. Suppliers have the option to expand in to other areas besides the oil and gas sector, such as electricity and transport. Increases in the installed power capacity can also help realise more and more industrial estate projects, which in turn, creates more businesses for those engineering companies.

Not all international suppliers have been convinced that they need to make a move to the African market. The issues for most of them are timing and whether the market is large enough to justify the required investment, and the perceived risks of doing business in Africa. After all, emerging markets are not limited to sub-Saharan African countries. However, the scale of population and its growth rate, the ever-growing abundance of resources, and the “room for development” of Africa may clearly indicate the continent is a market that no-one can afford to miss.

1.2 Objectives and structure of this report

The main objectives of this report are:

- To provide a detailed description of the oil and gas sector of sub-Saharan Africa that covers the whole value chain of the sector; and
- To describe the activities of, and opportunities for, international suppliers in the same value chain.

The report incorporates the views of industry professionals and provides in-depth analy-

sis of the business environment and the challenges both oil companies and suppliers are facing in Africa. The analysis will provide international suppliers with the means to begin weighing the risks against the potential gains of operating in certain parts of sub-Saharan Africa. It is hoped that the conclusions of this report will be pertinent to companies interested in operating in other sectors of the sub-Saharan African economy as well.

Following the introduction, this report provides a regional analysis and country analyses of six countries: Nigeria, Angola, Equatorial Guinea, Ghana, Mozambique and Tanzania. Conclusions are presented at the end of the report. The regional analysis depicts activities of not only the upstream but also the mid- and downstream operations of the oil and gas sector in Africa. Currently, attention is focused on the upstream of the sector, as the produced oil and gas is largely exported. As the local economy expands, however, hydrocarbon resources will increasingly be used locally, which will create capital investment projects in the downstream of the value chain, for international suppliers. The regional analysis chapter also discusses the regulatory framework as well as major IOCs, National Oil Companies (NOCs), and international suppliers involved in the sector.

Among the six countries for which analysis is made in the report, Nigeria, Angola and Equatorial Guinea are in the top 10 largest producers of both oil and gas in the African Continent with Nigeria and Angola as the two largest sub-Saharan African producers of oil. Ghana is one of the newest oil and gas producers in West Africa. Mozambique will soon become the first country in East Africa to develop the capacity to export LNG, with Tanzania likely to follow. For those six countries, in-depth analysis of the sector is made, including a discussion of the business environment in each country and the opportunities for international suppliers.

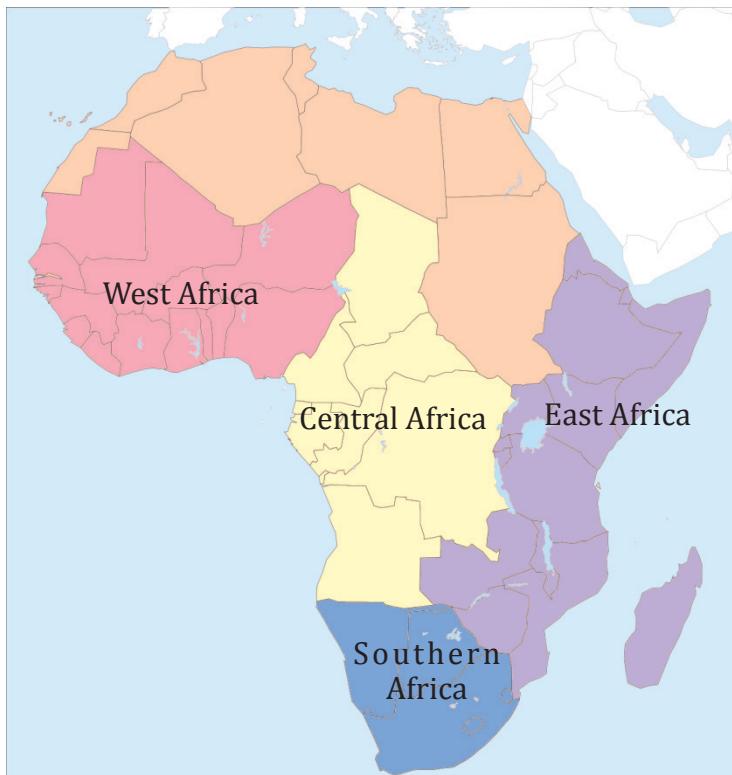
Each regional analysis is concluded with a list of opportunities for international suppliers. The conclusion of the report is in two parts. First, figures represent the comparative opportunities and risks for both IOCs and international suppliers in the sub-Saharan African countries considered and our findings are summarized. Second, by synthesizing common threads from each country analysis and drawing upon expertise from professionals in the oil and gas industry, the report concludes with recommendations for international companies who wish to be involved in the sub-Saharan African oil and gas sector.

2. Regional Analysis

2.1 Description of the region

This report is concerned with sub-Saharan Africa - the region of Africa to the south of the Sahara Desert. The World Bank, which includes Sudan and South Sudan in its definition of the region, estimates that in 2013 sub-Saharan Africa had a population of 910 million and a GDP of USD 1.29 trillion.¹ Containing both the poorest and the wealthiest countries on the continent, sub-Saharan Africa is divided by the United Nations into the four sub-regions as shown in Figure 2.1. Due to the recent split of Sudan into two countries, much of the relevant oil and gas data for these countries relate to both countries. For this reason and unless otherwise noted, in this publication both Sudanese nations are excluded from its definition of the sub-Saharan Africa region, even though South Sudan is classified by the United Nations as part of Eastern African, and therefore a sub-Saharan African nation.

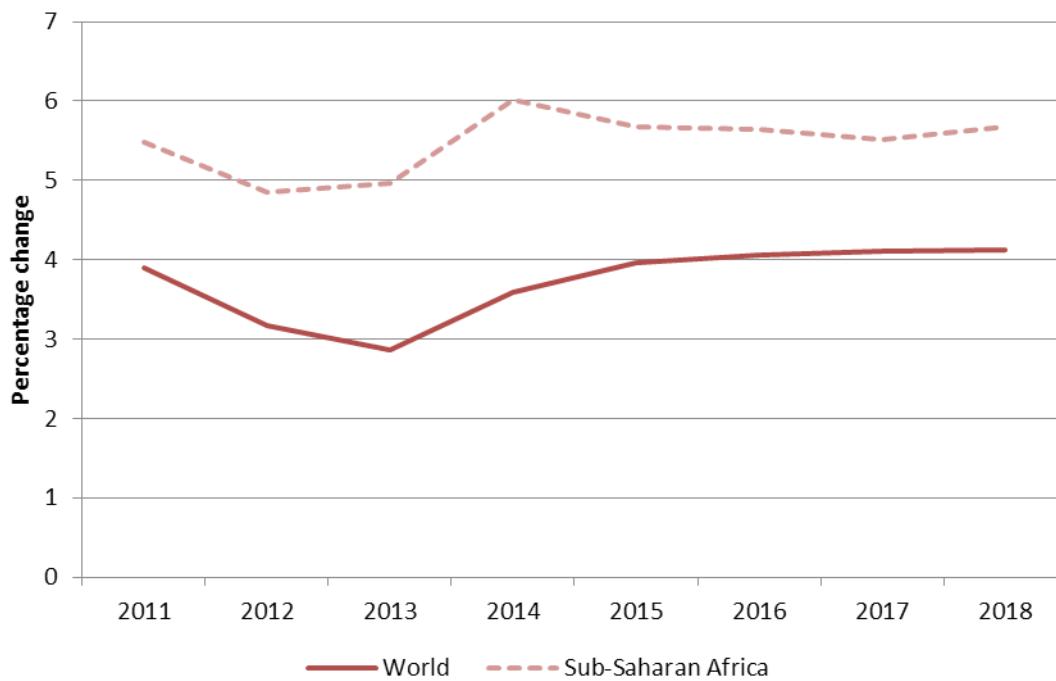
Figure 2.1: Regions of sub-Saharan Africa



Source: Base map from <www.freeworldmaps.net>.

The International Monetary Fund (IMF) projects the annual percentage growth in GDP for sub-Saharan Africa to hold steady above 5 per cent over the next five years, a figure that compares favourably with the global GDP growth which is expected to remain around 4 per cent to 2018 (see Figure 2.2). For those sub-Saharan oil producing countries, the oil and gas sector will constitute a significant proportion of this economic growth.

¹ The World Bank, Sub-Saharan Africa Statistics, 2012. <<http://data.worldbank.org/region/SSA>>.

Figure 2.2: Annual GDP growth projection with constant prices (2011-2018)

Source: IMF, World Economic Outlook Database, October 2013. <<http://www.imf.org/external/pubs/ft/weo/2013/02/weodata/index.aspx>>.

In total, 19 African countries are significant producers of oil and/or gas, although sub-Saharan African production remains largely concentrated in Nigeria and Angola. Africa has enormous natural resource wealth and yet suffers high levels of poverty. In 2012, sub-Saharan Africa produced 5.7 MMbbl/d of crude oil, yet the benefits of this vast resource rarely reach the general local population.²

The value of the oil and gas sector to those sub-Saharan African countries that have their own domestic industry is inestimable. If the barriers to the development of these domestic industries can be overcome and indigenous participation can be ensured, the potential to leverage the vast natural resources of these generally poor and under-developed nations and to translate these resources into meaningful development for the local population in each country is vast. As the economies grow, investment opportunities for international suppliers will proliferate.

2.1.1 Consumption

Non-renewable fossil fuels - oil, natural gas and coal - make up almost 90 per cent of commercial energy consumed across the globe. While sub-Saharan Africa is home to roughly 12 per cent of the global population and supplied approximately 6.5 per cent of the world's oil in 2012, the region's commercial energy consumption was less than 3 per cent of the global total. No African country currently exceeds 1 MMbbl/d of oil equivalent energy consumption, primarily due to the low level of development and industrialization

² US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm>>.

within the region.³

Despite this low level of industrialization, Africa's energy consumption has been increasing. In 2012, Africa as a whole consumed 122.8 billion cubic metres (bcm) of natural gas; the corresponding figure for 2002 was 69.6 bcm. Consumption has therefore increased by over 40 per cent on the continent during the intervening 10 years.⁴

Most of the commercial energy consumption in Africa and other developing countries occurs in the transport and electricity sectors. Natural gas is expected to gradually replace the consumption of oil in the electricity sector and to find users in the industrial sector. The natural gas consumption in Africa is predicted to increase by almost threefold by 2040 and governments are increasingly emphasizing the importance of investing in the natural gas downstream infrastructure in order to reduce the cost of their energy supply.⁵

2.1.2 Legal and regulatory framework

In recent years, oil producing countries in sub-Saharan Africa have enacted, or are trying to establish, a legal and regulatory framework to increase the economic benefit of hydrocarbon production for their own countries. Such a framework includes a hydrocarbon law and a local content law. Table 2.1 lists those laws in countries in sub-Saharan Africa. Further detail can be found in the country analysis Chapters 3 to 8.

Table 2.1: List of hydrocarbon and local content laws

Country	Laws
Nigeria	<ul style="list-style-type: none"> • Petroleum Profit Tax Act, 1979 • Minerals Oils Regulations, 1963 • Oil Pipeline Act, 1965 • Petroleum Act, 1969 • Petroleum Regulations, 1996 • Petroleum Decree, 1969 • Nigerian National Oil Corporation Decree, 1977 • Associated Gas Re-injection Decree, 1985 • Associated Gas Framework Agreement, 1992 • Financial Act, 1998 • Financial Amendment Act, 1999 • Nigeria Liquefied Natural Gas Act, 1999 • Downstream Gas Act, 2005 • Natural Gas Reform Act, 2005 • Nigerian Content Bill, 2010

3 US Energy Information Administration, Country Statistics, 2013. <<http://www.eia.gov/countries/index.cfm?view=consumption>>.

4 BP Statistical Review of World Energy, June 2013. <http://www.bp.com/content/dam/bp/pdf/statistical-review/statistical_review_of_world_energy_2013.pdf>.

5 US Energy Information Administration, "International Energy Outlook 2013," July 2013. <[http://www.eia.gov/forecasts/ieo/pdf/0484\(2013\).pdf](http://www.eia.gov/forecasts/ieo/pdf/0484(2013).pdf)>.

Angola	<ul style="list-style-type: none"> • Petroleum Activities Law, 2004 • Petroleum Taxation Law, 2004 • Petroleum Customs Law, 2004 • Law for the Promotion of Business for Local Private Companies, 2003 • Mandatory Hiring and Training of Angolan Citizens (Decree 20/82 and Law 17/09), 2009 • Fund for Training and Development of Human Resources (Decree 14/10), 2010 • Contracting Services from Local Companies in the Oil Sector (Decree 127/03 and 48/06) • Foreign Exchange Regime for Petroleum Sector, 2012 • Private Investment Law, 2011
Equatorial Guinea	<ul style="list-style-type: none"> • Hydrocarbon Law, 2006 • Petroleum Regulations, 2013
The Republic of Congo	<ul style="list-style-type: none"> • Petroleum Code, 1994 • Decree 200-160, 2000 • Attribution Decree 2008-15, 2008
Gabon	<ul style="list-style-type: none"> • Hydrocarbon Activities, 1962, 1975, 1983 • Hydrocarbons Code (draft)
South Africa	<ul style="list-style-type: none"> • Petroleum Products Act, 1977 • Petroleum and Liquid Fuels Charter, 2000 • Preferential Procurement Policy Framework Act, Act 5, 2000, 2011 • Mineral and Petroleum Resources Development Act 28, 2002 • Trade Administration Act 71, 2002 • Gas Act, 2005 • Mineral and Petroleum Resources Royalty Act, 2008 • Mineral and Petroleum Resources Development Amendment Bill 15, 2013
Chad	<ul style="list-style-type: none"> • Law 27, 2006 • Law 006, 2007 • Decree 0015. 2007 • Law 001, 2010 • Petroleum Law, 2010 • Decree 796, 2010
Cameroon	<ul style="list-style-type: none"> • Petroleum Code, 1999 • Petroleum Regulations, 2000 • SNH, Decree No. 2008/012, 2008
The Democratic Republic of the Congo	<ul style="list-style-type: none"> • Mines and Hydrocarbons Law. 1986 • COHYDRO, 1999 • Hydrocarbons Bill (draft)

Mozambique	<ul style="list-style-type: none"> • The Petroleum Law, 2011 • Mega Projects/PPP Law, 2010 • New Labour Law, 2007 • Decree 63/2011
Ghana	<ul style="list-style-type: none"> • Ghana National Petroleum Law, 1983 • Exploration and Production Law, 1984 • Petroleum Income Tax Law, 1987 • Petroleum Commission Act, 2011 • Petroleum Revenue Act Management, 2011 • Petroleum (Local Content and Local Participation) Regulation, 2013 (LI 2204) • Ghana Petroleum Regulatory Authority Bill (Pending)
Tanzania	<ul style="list-style-type: none"> • Petroleum Act, 1980 • New Model Production Sharing Agreement, 2013 • Natural Gas Policy (draft)
Uganda	<ul style="list-style-type: none"> • National Oil and Gas Policy, 2008 • The Petroleum (Exploration, Development and Production) Act, 2012

Source: see footnotes.⁶

There are three main types of upstream contractual arrangements in operation across sub-Saharan Africa: joint ventures (JVs), production sharing agreements (PSAs) and service contracts (SCs). A JV involves two parties, typically a domestic company and an international company, who come together and agree to take on a project by contributing equity. A PSA is a contract between a government and an extraction company which includes an agreement of how the profits from the extracted resource will be shared between the two parties. An SC is a long term-contractual framework which allows governments to acquire the expertise and capital of an IOC without handing over the field or production rights to the IOC.

By partnering with local African enterprises through such contractual arrangements international suppliers and operators can meet the local content laws of the countries in which they wish to operate. The benefit to the international suppliers is the knowledge those indigenous companies can bring of the intricacies of doing business locally, a critical factor in successful operations in Africa.

6 Jan van As, P, "Local Content Angola," <<http://localcontentangola.com/local-content>>; "Local Content Online," Menas, 2008. <<http://www.menas.co.uk/localcontent/home.aspx?country=78>>; Whitehead, E., "Ghana passes new local content rules," Afronline, the Voice of Africa, 4 December 2013. <<http://www.afronline.org/?p=31667>>; Silva et al., "African Focus, Gabon – Phoenix Rising?" Petroleum Africa Magazine, November 2011. <http://www.mirandalawfirm.com/uploadedfiles/20120203_e5812a.pdf>; Freshfields, "Cameroon," March 2013. <http://m.freshfields.com/uploadedFiles/SiteWide/News_Room/Insight/Africa_ENR/Cameroon/Cameroon%20oil%20and%20gas.pdf>; Freshfields, "Chad," March 2013. <http://www.freshfields.com/en/africa/africa_oil_and_gas/chad/>; Pickering, J., "Why Changing Congo's Proposed Oil Legislation Should Be Top of the Bill," Think Africa Press, 24 September 2013. <<http://www.thinkafricapress.com/drc/why-changing-congo-proposed-oil-legislation-should-be-top-bill-virunga>>; "Oil and Gas Tax Guide for Africa 2013," PWC, 2013. <http://www.pwc.com/en_TZ/tz/pdf/pwc-oil-and-gas-tax-guide-for-africa-2013.pdf>; "Local Content Verification," SABS. <<https://www.sabs.co.za/Local-Content/index.asp>>.

2.1.3 Barriers to economic development in sub-Saharan Africa

Sub-Saharan Africa has healthy projections for annual GDP growth and for increasing energy consumption, and has begun to put in place a legal and regulatory framework for the oil and gas sector which aims to both encourage international involvement as well as to ensure local participation. These are encouraging developments in an industry which is becoming increasingly attractive to international suppliers. However, there remain significant challenges for international companies seeking to do business in the oil and gas sector in sub-Saharan Africa. The main concerns are summarized below and are examined in more detail in Chapters 3 to 8.

Infrastructure

In general, the last decade has seen notable improvements to infrastructure on the continent. However, insufficient basic infrastructure remains a major obstacle for economic development. The World Economic Forum has ranked 148 countries according to infrastructure and lists Angola as one of the worst, undoubtedly because of the effects of its civil war which spanned a period of 27 years between 1974 and 2002. Alongside Mozambique, Angola is also in the top 10 ranking for worst roads.⁷ As a result of this poor infrastructure, IOCs working in the oil and gas sector in Africa often construct what they need themselves when deemed necessary, such as purpose-built electricity generators and airports. In many cases, the operational constraint will not be the investment required by the IOC, but the legislation enforced by the country in which they are looking to operate. The legislative approval process may slow down the pace of development of oil and gas infrastructure projects. Despite this, when an IOC commits to a region, significant opportunities arise for international suppliers.

Security

Even after the cessation of many civil wars, sub-Saharan Africa is no stranger to terrorism and political violence. The Angolan province of Cabinda produces the most oil but it is also home to a separatist terrorist group, the Front for the Liberation of the Enclave of Cabinda (FLEC). While separation is at present unlikely, the activities of this group are clearly relevant to business operations in the region. Recent problems with the Trans Niger pipeline, allegedly one of the most sabotaged pipelines in the world, have also been widely reported.⁸ An explosion on the pipeline in early 2013 resulted in 6 Mbbl of crude oil spilling into waterways near the village of Bodo. The explosion is thought to have been caused by a botched attempt to steal crude oil and highlights the severity of oil theft in Nigeria. In 2013, President Goodluck Jonathan proclaimed that 300 to 400 Mbbl/d (more than 10 per cent of Nigeria's production) is lost each month. This is equivalent in value to a loss of USD 1.65 billion per month.⁹

The security issues facing Africa remain complicated and any discussion of the risks involved in operating across the continent should include a comprehensive analysis of any and all security threats. Limited infrastructure and rising security issues such as oil theft, pipeline sabotage and piracy in the Gulf of Guinea highlight some of the many challenges for IOCs interested in doing business in Africa.¹⁰

7 "Executive Opinion Survey," World Economic Forum, 2013. <<https://wefsurvey.org/index.php?sid=28226&intro=0>>.

8 Vidal, J., "£1 billion a month: The spiralling cost of oil theft in Nigeria," The Guardian, 6 October 2013. <<http://www.theguardian.com/global-development/2013/oct/06/oil-theft-costs-nigeria>>.

9 Ibid

10 International Maritime Organisation, Annual Report on Acts of Piracy and Armed Robbery against

Corruption

Corruption and poor governance are still major impediments to operating on the continent with the company and employees' integrity put at risk. Nigeria is ranked 139 out of 174 on the Transparency International (TI) Corruption Perceptions Index. Angola fares even worse ranked at 157, and Equatorial Guinea is listed as 163, although Tanzania and Mozambique perform somewhat better and are ranked at 102 and 123 respectively.

¹¹ Most sub-Saharan African countries also perform very poorly when examined under the Human Development Index (HDI), with only South Africa, Namibia, Botswana and Gabon ranked as medium HDI countries.¹²

Regulatory standards and the control of corruption have a tendency to be notably weaker in oil-rich African countries; Equatorial Guinea's oil revenue, for example, is held as a state secret. Not only does corruption raise the costs and risks of operations in that country, but there are also ramifications in the broader political and economic environment. It is often argued that natural resources can decrease the quality of public spending and encourage rent seeking.¹³ This has certainly been the case across Africa. According to a 2011 IMF report on Angola there were USD 32 billion in missing government funds suspected to be linked to the state oil company, Sonangol.¹⁴ This amount is roughly equivalent to a quarter of the country's GDP.

Many oil and gas producing countries have anti-corruption agencies in relation to the extractive industries. The Extractive Industries Transparency Initiative (EITI) is a global coalition of governments and companies which has the aim of reducing corruption in the extractive industries. Thirteen countries in sub-Saharan Africa are currently EITI compliant and have their own EITI national implementation. However, the scope and effectiveness of these organisations is under question. For example, in Mozambique, the diversion of public funds is thought to occur before EITI becomes involved in the monitoring process.¹⁵

IOCs too have succumbed to the temptation to engage in corruption. In 2011, the company M.W. Kellogg Limited (MWKL), a subsidiary of Halliburton, received a USD 11 million fine for hiring a lawyer who bribed government officials in order to receive the contract to build LNG facilities in Nigeria.¹⁶

Further details on the barriers to industry development can be found in the 'Business environment' section in Chapters 3 to 8.

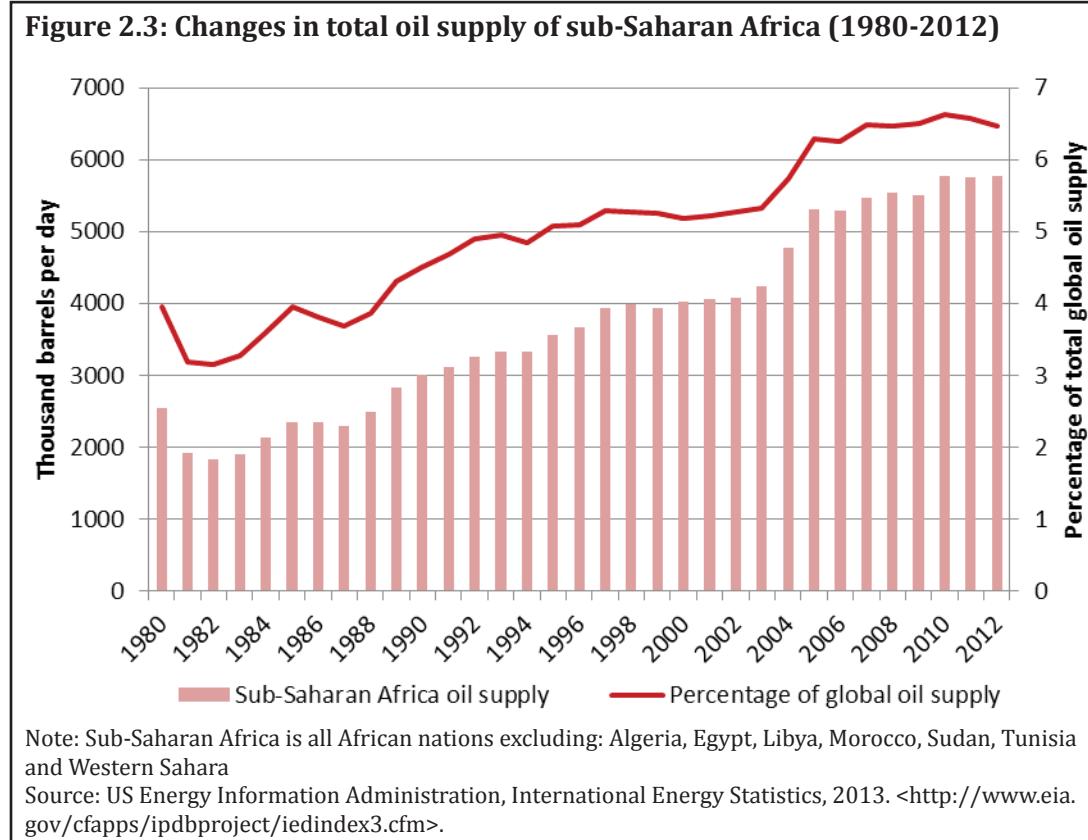
- Ships, 2012. <<http://www.imo.org/>>.
- 11 Transparency International, "Corruption Perceptions Index 2011," <<http://cpi.transparency.org/cpi2012/results/>>.
- 12 UNDP. "Human Development Report 2013," 2013. <<http://hdr.undp.org/en/mediacentre/humandevlopmentreportpresskits/2013report/>>.
- 13 Auty, R., "Resource Abundance and Economic Development," Oxford University Press, 2001; Ploeg, F. van der, "Africa and National Resources," Background Paper for AfDB, 2007.
- 14 IMF, "Angola," IMF Country Report No. 11/346, 26 October 2011. <<http://www.imf.org/external/pubs/ft/scr/2011/cr11346.pdf>>.
- 15 Ossemane, R., "Is the Extractive Industries Transparency Initiative Relevant for Reducing Diversions of Public Revenue? The Mozambican Experience," Governance of Africa's Resources Programme, Policy Briefing 61, January 2013. <http://dspace.cigilibrary.org/jspui/bitstream/123456789/33612/1/saia_spb_61_ossemane_20130205.pdf?1>
- 16 World Bank, UNODC, Stolen Asset Recovery Initiative, 2013. <<http://star.worldbank.org/corruption-cases/node/20226>>; Trace Compendium, "Halliburton/KBR," 2014. <<https://www.traceinternational2.org/compendium/view.asp?id=15>>.

2.2 Upstream activities

2.2.1 Overview

At present, oil and gas activity in Africa is primarily concerned with upstream exploration and production. East Africa alone is expected to see investment of USD 7 billion per year in the upstream industry by 2018.¹⁷ According to KPMG, there are currently approximately 500 oil companies participating in hydrocarbon exploration across the continent.¹⁸ The number of active rigs operating across the region has also increased considerably in recent years. The Baker Hughes Monthly International Rig Count listed a total of 154 rigs for February 2014 in Africa; Angola alone was listed as having 19 rigs, Nigeria 18 and Kenya 12. Across the entire continent in 2006, an average of only 58 rigs were in operation.¹⁹

Between 1980 and 2012, total global oil supply rose from 64 MMbbl/d to over 89 MMbbl/d. Over the same period in sub-Saharan Africa the corresponding figure increased from approximately 2-2.5 MMbbl/d to nearly 6 MMbbl/d. This represents an increase in Africa's proportion of the total global supply from approximately 4 to 6.5 per cent (see Figure 2.3).



17 Mainwaring, J., "Wood Mackenzie: East African Upstream Investment to Hit \$7B by 2018", Rigzone, 9 October 2013. <http://www.rigzone.com/news/article.asp?hp=1&a_id=129504>.

18 KPMG, "Oil and Gas in Africa," 2013. <<https://www.kpmg.com/Africa/en/IssuesAndInsights/Articles-Publications/Documents/Oil%20and%20Gas%20in%20Africa.pdf>>.

19 Baker Hughes International, Worldwide Rig Count, February 2014. <<http://phx.corporate-ir.net/phoenix.zhtml?c=79687&p=irol-rigcountsoverview>>.

While the overall share of the global total supply remains comparatively low, the 2.5 per cent share increase seen in sub-Saharan Africa compares favourably with other regions in the world. Only Central and South America had a larger growing share between 1980 and 2012, with an increase from 6 per cent to 8.7 per cent (Figure 2.4).

Figure 2.4: Regional contribution to total global oil supply (1980 and 2012)



Note: Sub-Saharan Africa is all African nations excluding: Algeria, Egypt, Libya, Morocco, Sudan, Tunisia and Western Sahara.

Eurasia includes Armenia, Azerbaijan, Belarus, Estonia, Former U.S.S.R, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm>>

Likewise, recent exploration activities across the continent have resulted in rising levels of natural gas production. Figure 2.5 shows that gross natural gas production in sub-Saharan Africa has increased threefold since 1990. The share of the region in the total world production also rose from 1.3 per cent in 1990 to over 2.5 percent by 2006. According to the African Development Bank, natural gas production in Africa is projected to reach 10 trillion cubic feet (tcf) by 2030, more than double the current level.²⁰ LNG production capacity expansion in sub-Saharan Africa will ensure that the continent plays an increasingly important role in the global natural gas market.

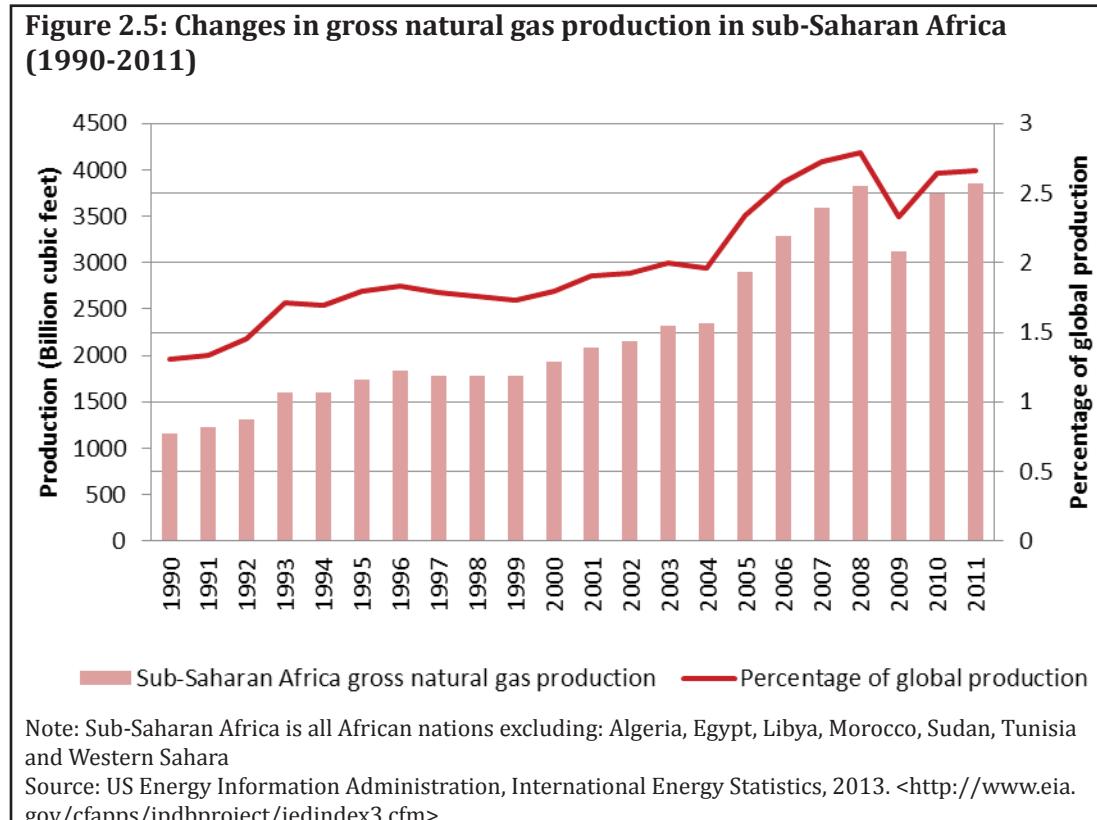
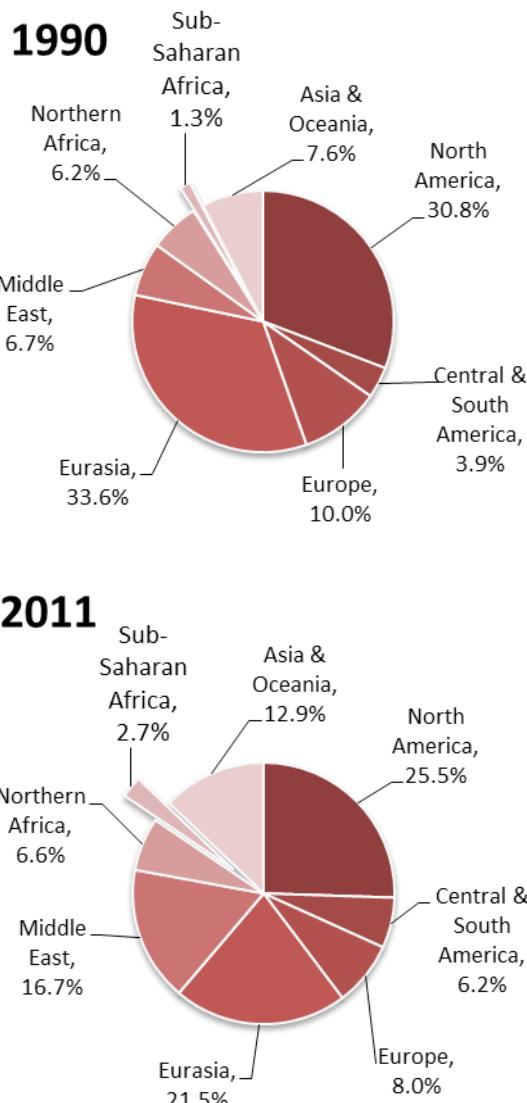


Figure 2.6 compares the regional contribution of the global gas production in 1990 and 2011. All regions have expanded their production over this period at the expense of Europe and Eurasia, with sub-Saharan Africa doubling its share from 1.3 to 2.7 per cent. As production capacity and infrastructure improves, and in light of recent exploration activities in East Africa, this share is set to rise significantly. However, the LNG market is not without competition. Australia and the US are also pushing to become major LNG exporters along with the current world leader, Qatar. The concurrent rise of three major sources of LNG could outstrip global demand and reduce the price of LNG, impacting most heavily upon the sub-Saharan nations given the fact that sub-Saharan Africa's LNG projects often face lengthy delays during construction before they become operational.

20 African Development Bank and the African Union, "Oil and Gas in Africa", 2009, p62. <<http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Oil%20and%20Gas%20in%20Africa.pdf>>.

Figure 2.6: Regional contribution to total global natural gas production (1990 and 2011)



Note: Sub-Saharan Africa is all African nations excluding: Algeria, Egypt, Libya, Morocco, Sudan, Tunisia and Western Sahara.

Eurasia includes Armenia, Azerbaijan, Belarus, Estonia, Former U.S.S.R, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm>>.

2.2.2 Proven reserves and production

The term “proven reserves” is defined as the quantity of energy resource estimated with a high level of confidence to be recoverable with existing equipment and under current operating conditions. Proven reserve estimates are based on geological and engineering data which is less available in the African context. Weak government oversight of oil and gas companies that may not wish to disclose accurate information, combined with competing state interests within the sector and a lack of geological survey data may

result in erroneous or compromised data. Despite these problems, there has been a considerable increase in knowledge about Africa's proven oil and gas reserves. According to US EIA, proven oil reserves in Africa grew by nearly 120 per cent in the past 30 years from 57 billion bbl in 1980 to 124 billion bbl in 2012.²¹ Likewise, Africa's proven natural gas reserves rose by over 14 per cent from 210 tcf in 1980 to 509 tcf in 2012.²²

The increase in proven reserves is attributable to the following three key factors: rising oil prices, technological advancements and improvements in security. Rising oil prices have led to greater investment in oil and gas exploration in less explored regions of the globe such as sub-Saharan Africa, while advances in technology have improved the rate of recovery and made production possible in previously inaccessible fields, especially deepwater regions. This has been particularly significant in West Africa where the industry has been driven by advances in offshore technology. Increases in proven reserves have also taken place against the backdrop of improved political stability in sub-Saharan Africa, which has encouraged more extensive exploration and led to significant discoveries of oil and gas in countries such as Kenya, Mozambique, Uganda and Tanzania.

Africa as a whole currently supplies about 10 per cent of the world's oil; Nigeria and Angola alone account for almost half of this figure.²³ The region has a 7.8 per cent share of the total global proven oil reserves and some estimates suggest that there might be as much as 100 billion bbl of oil offshore awaiting discovery.²⁴ The reasons why the global share of production is higher than the global share of reserves may be attributed to the late development of Africa's oil and gas fields.

In 2012, Africa produced 6.4 per cent of the world's gas, and had 7.7 per cent of the global proven gas reserves.²⁵ While globally the Middle East remains dominant as a producer of oil and gas, sub-Saharan Africa is increasingly being seen as a viable alternative source.

Table 2.2 exhibits 2012 statistical data of oil and gas production and reserves of countries in sub-Saharan Africa. Within sub-Saharan Africa, West Africa currently has the highest proven crude oil reserves followed by Central Africa as highlighted in the table. Overall, 21 countries in Africa have proven oil reserves and two sub-Saharan African countries - Angola and Nigeria - rank in the top 10 as world net oil exporters.²⁶ Those two countries also have significant proven reserves of natural gas, with 12 and 182 trillion tcf of proven reserves respectively. These figures made up the majority of the 213 tcf total proven reserves for sub-Saharan Africa in 2012; when set against production figures for the same year of 1,688 billion cf, the massive potential for growth in this region's natural gas industry is clear.

21 KPMG, "Oil and Gas in Africa," 2013. <<http://www.kpmg.com/Africa/en/IssuesAndInsights/Articles-Publications/Documents/Oilper cent20andper cent20Gasper cent20inper cent20Africa.pdf>>.

22 US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm>>.

23 BP Statistical Review of World Energy, June 2013. <http://www.bp.com/content/dam/bp/pdf/statistical-review/statistical_review_of_world_energy_2013.pdf>.

24 KPMG, "Oil and Gas in Africa," 2013. <<http://www.kpmg.com/Africa/en/IssuesAndInsights/Articles-Publications/Documents/Oilper cent20andper cent20Gasper cent20inper cent20Africa.pdf>>.

25 BP Statistical Review of World Energy, June 2013. <http://www.bp.com/content/dam/bp/pdf/statistical-review/statistical_review_of_world_energy_2013.pdf>.

26 KPMG, "Oil and Gas in Africa," 2013. <<http://www.kpmg.com/Africa/en/IssuesAndInsights/Articles-Publications/Documents/Oilper cent20andper cent20Gasper cent20inper cent20Africa.pdf>>; US Energy Information Administration, Country Statistics, 2013. <<http://www.eia.gov/countries/index.cfm?topL=exp>>.

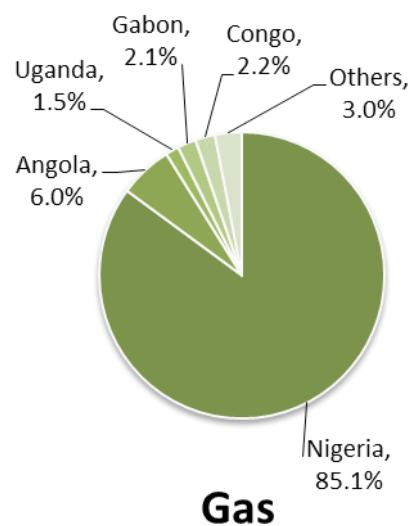
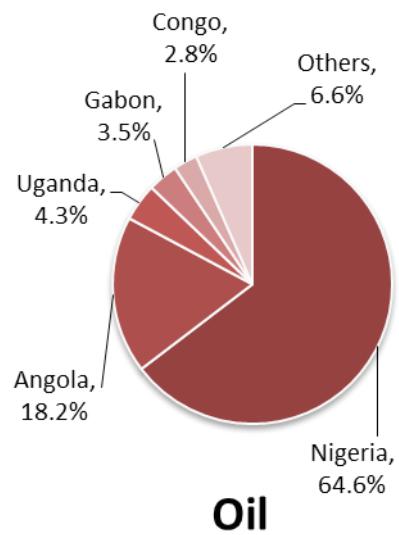
Table 2.2: Oil and gas production and proven reserves of sub-Saharan African countries

Region	Country	Oil		Gas	
		Production 2012 (Mbbl/d)	Proven Reserves 2012 (Billion bbl)	Production 2012 (Billion cf)	Proven Reserves 2012 (Trillion cf)
West Africa	Benin	0	0.01	0	0.04
	Cote d'Ivoire	38.56	0.1	52.97	1
	Ghana	79.63	0.66	0	0.8
	Mauritania	6.58	0.02	0	1
	Niger	20	0	0	0
	Nigeria	2,524.14	37.2	1,107.48	182
	<i>Sub-total</i>	2,668.91	37.99	1,160.45	184.84
Central Africa	Angola	1,871.64	10.47	26.56	12.93
	Cameroon	63.52	0.2	5.3	4.77
	Chad	104.48	1.5	0	0
	Democratic Republic of the Congo	20	0.18	0	0.04
	Congo	291.91	1.6	40.61	3.2
	Equatorial Guinea	318	1.1	242.97	1.3
	Gabon	241.96	2	2.47	1
	<i>Sub-total</i>	2,911.51	17.05	317.91	23.24
Eastern Africa	Tanzania	0	0	30	0.23
	Mozambique	0	0	135 (2011)	4.5
	Kenya	0	0	0	0
	Uganda	0	2.5	0	0.5
	<i>Sub-total</i>	0	2.5	165	5.23
Southern Africa	South Africa	180.95	0.02	45.2	0.57
	<i>Sub-total</i>	180.95	0.02	45.2	0.57

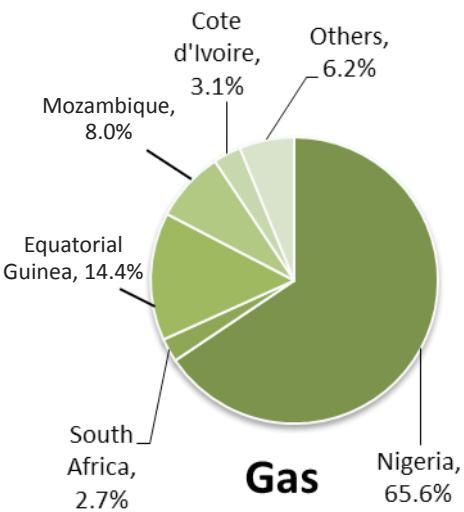
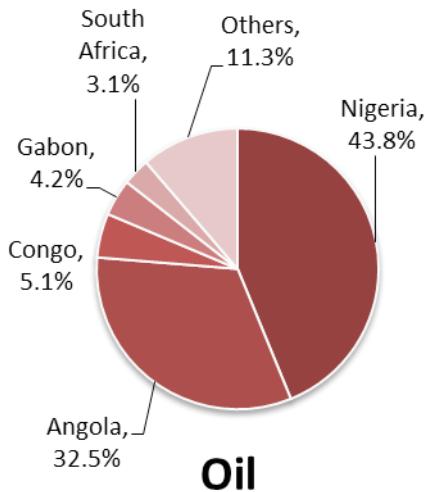
Total sub-Saharan Africa	5,761.37	57.56	1,688.56	213.88
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Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm>>.

Figure 2.7 and Figure 2.8 exhibit the top countries in sub-Saharan Africa in terms of reserves and production of oil and gas. Nigeria's domination of the sub-Saharan Africa oil and gas industry is clear, both in terms of proven reserves (Figure 2.7) and current production (Figure 2.8). Nigeria's proportion of sub-Saharan Africa's proven reserves for oil currently exceeds that of its production by over 20 per cent. This implies a shortfall in production capacity, and suggests that opportunities may arise for international suppliers to address the shortfall. These figures also suggest the potential for growth in the Ugandan oil industry, which currently has 4.3 per cent of the region's proven reserves, but negligible production, and also in the Angolan natural gas industry, which has 6 per cent of the proven reserves but only about 1.6 percent of the regional production.

Figure 2.7: Top countries of sub-Saharan Africa by proven reserves (2012)

Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm>>.

Figure 2.8: Top countries of sub-Saharan Africa by production (2012)

Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm>>.

Floating production, storage and offloading (FPSO)

FPSOs are vast, floating vessels which are designed to store or process oil from remote offshore production sites before being offloaded to oil tankers. They are particularly suited to areas where the construction of a pipeline for the transfer of hydrocarbon reserves is not feasible. Some of the major FPSO vessels active in sub-Saharan Africa are listed in Table 2.3.

Table 2.3: Major FPSOs in sub-Saharan Africa

Country	Description
Angola	<ul style="list-style-type: none"> • Mondo: Exxon Mobil, Block 15 - oil production of 100 Mbbl/d • Saxy-Batuque: Exxon Mobil; Block 15 - oil production of 105 Mbbl/d • Xikomba: Exxon Mobil, Block 15 - storage capacity 1.5 MMbbl, oil production of 100 Mbbl/d • Sanha LPG: Chevron - LPG production of 37 Mbbl/d • Kuito: Chevron, Cabinda - oil production of 100 Mbbl/d, gas production of 30 MMcf/d • Kizomba A: ExxonMobil, Block 15 - storage capacity of 2.2 MMbbl, oil production of 250 Mbbl/d • Pazflor: Total, Block 17 - storage capacity of 1.9 MMbbl, oil production of 200 Mbbl/d, gas production of 150 MMcf/d • Gimboa: Saipem, Block 4/05 - storage capacity of 1.8 MMbbl, oil production of 60 Mbbl/d • Girassol: Total, Block 17 - storage capacity of 2 MMbbl, oil production of 200 Mbbl/d • Dalia: Total, Block 17 - storage capacity of 2 MMbbl, oil production of 240 Mbbl/d • Kizomba B: ExxonMobil, Block 15 - storage capacity of 2.2 MMbbl, oil production of 250 MMbbl/d • Greater Plutonio: BP, Block 18 - storage capacity of 1.7 MMbbl, oil production of 240 MMbbl/d • PVSM: BP, Block 31 - storage capacity of 1.6 MMbbl, oil production of 157 Mbbl/d.
Equatorial Guinea	<ul style="list-style-type: none"> • Serpentina: Exxon Mobil, Zafiro Southern Expansion Area - oil production of 111 Mbbl/d • Zafiro Producer: Exxon Mobil, Zafiro Block B - oil production of 190 Mbbl/d • Aseng: Noble Energy, Aseng Field - storage of 1.5 MMbbl, oil production of 80 Mbbl/d • Sendje Ceiba: Hess, Ceiba Oil Field - oil production of 160 Mbbl/d.
Gabon	<ul style="list-style-type: none"> • Knock Allan: CNRL, Olowi - oil production of 35 Mbbl/d • Petroleo Nautipa: Vaalco Energy, Etame - oil production of 30 Mbbl/d.
Ghana	<ul style="list-style-type: none"> • Kwame Nkrumah: Tullow Oil, Jubilee Field - oil production of 120 Mbbl/d, storage of 1.6 MMbbl, capable of injecting 230 Mbbl/d of water and 160 MMcf/d of produced gas.
Ivory Coast	<ul style="list-style-type: none"> • Baobab Ivoirien MV10: MODEC - storage capacity of 2 MMbbl, oil production of 70 Mbbl/d • Espoir-Ivoirien: CNR; storage capacity of 1.1 MMbbl, oil production of 45 Mbbl, gas production 80 MMcf/d.

Mauritania	<ul style="list-style-type: none"> Berge Helene: Woodside, Chinguetti - storage capacity of 1.6 MMbbl, oil production of 75 Mbbl/d.
Nigeria	<ul style="list-style-type: none"> Bonga: Shell - oil production of 202 Mbbl/d Usan/Ukot: Total - oil production of 180 Mbbl/d Sea Eagle EA: Shell, OML 79 - storage capacity of 1.4 MMbbl, separation facility Sendje Berge: Addax, Okwori - storage capacity of 2 MMbbl, oil production of 50 Mbbl/d Agbami: Chevron - storage capacity of 2.2 MMbbl, oil production of 250 Mbbl/d Abo: Agip - storage capacity of 930 Mbbl, oil production of 44 Mbbl/d Akpo: Total - oil production of 225 Mbbl Mystras: Agip, Okono and Okpono - storage capacity of 1 MMbbl, oil production of 46 Mbbl/d Erha: ExxonMobil - storage capacity of 2.2 MMbbl, oil production of 140 Mbbl/d Armada Perkasa: AMNI, Okoro-Setu - storage capacity of 360 Mbbl, oil production of 27 Mbbl/d Armada Perdana: Agip, Oyo - storage capacity of 1.1 MMbbl; oil production of 40 Mbbl/d Knock Adoon: Addax, Antan - oil production of 60 Mbbl/d Trinity Spirit: Shebah, Ukpokiti - storage capacity of 2 MMbbl; oil production of 22 Mbbl/d.
Republic of Congo	<ul style="list-style-type: none"> Azurite FDPSO: Murphy, Pointe Noire - oil production of 60 Mbbl/d. N'Kossa LPG FPU: Total, N'Kossa - propane production of 800 metric tonnes per day, butane production of 530 metric tonnes/d. Conkouati: Perenco, Yombo - oil production of 40 Mbbl/d.

Source: FPSO, FPSO list. <<http://fpso.com/fpsol/>>.

More FPSOs will be required as the number of offshore production wells increases. Oil companies have to choose whether to own an FPSO or to lease it from an FPSO contractor at the initial stage of a field development involving an FPSO. In the first case, the oil company awards an EPC contract, and in the second case, a contract is awarded for the lease. In 2013, of the 42 FPSOs operating in Africa, 19 were leased, accounting for 45 per cent.²⁷ In the same year, Africa had 33 FPSO projects planned with 13 in Angola and 9 in Nigeria.²⁸ The commissioning of smaller FPSOs depends upon the near term oil price expectations and the availability of financing. Local content laws can greatly affect the cost of FPSOs, such as the Egina FPSO project in Nigeria which cost over USD 3 billion. In this project, Samsung and Total Upstream Nigeria Ltd have been taken to court surrounding alleged exclusion of the local partner during construction.²⁹ Furthermore, the future developments of FPSOs are likely to be negatively affected by investment in cheaper shale oil projects.

27 Future FPSO Projects in the Decision-Making Process, Emerging FPSO Forum, 25 September 2013.

28 Ibid.

29 Alike, E., "Nigerian Firm Drags Samsung, Total to Court over \$3.8bn Egina Project," This Day Live, 30 January 2014. <<http://www.thisdaylive.com/articles/nigerian-firm-drags-samsung-total-to-court-over-3-8bn-egina-project/170112/>>.

2.2.3 Exploration activities

Significant hydrocarbon exploration activity has taken place throughout sub-Saharan Africa since the 1950s. The majority of wells, however, were drilled after 2010. Recent finds of significant natural gas reserves in Mozambique and Tanzania, combined with discoveries in the Albertine Graben region of Uganda, which has a similar geology to the Turkana Rift Basin in Kenya, have resulted in extensive exploration activity in Kenya. A license auction is expected to take place after the Kenyan Energy Bill is drafted which will most likely be in mid-to-late 2014.³⁰ Cameroon and Angola announced license auctions in 2014.³¹ Increasing levels of exploration are expected across the entire East African region.³² Exploration will continue in West Africa, but new finds are not guaranteed to offset maturing old fields in some countries. Table 2.4 summarizes recent exploration projects across the sub-Saharan Africa region as a whole, and shows that recent exploration is not contained within any one sub-region, but is ongoing across the whole continent.

Table 2.4: Exploration projects in sub-Saharan Africa

Country	Description	Main Companies Involved
Cameroon	Etinde Block lies in shallow water offshore Cameroon crossing the Doula and Rio Del Rey Basins. The permit area has had a number of hydrocarbon discoveries. This area has been subject to ongoing exploration and appraisal.	Vitol E&P, Victoria Oil and Gas, Perenco, SNH
Chad	Exploration in Block BDS 2008, Manga and Chari-Ouest Block 3 has continued since 2011 when the blocks were awarded.	ERHC
Congo	Oil and gas discoveries were made at the E-1 well in the Elephant prospect, Haute Mer A license area. The discoveries will be tested in 2014 and exploration of this area continues. The exploration license for this area covers 488 km ² in deepwater offshore Congo. Haute Mer B license area (exploration license) covers a further 402 km ² .	Oryx Petroleum, CNOOC, Gulf Keystone Petroleum

30 Oredein, O., E&P, "Kenya's Energy Bill Delays Oil Licensing Round," 2013. <http://www.epmag.com/Technology-Regulations/Kenyas-Energy-Bill-Delays-Oil-Licensing-Round_124406>.

31 "Angola 2014 Onshore Big Round," Oil Voice, 31 January 2013. <http://www.oilvoice.com/n/Cameroon_2014_Bid_Round/672b4812de4f.aspx#gsc.tab=0>; "Cameroon 2014 Big Round," Oil Voice, 3 March 2014, <http://www.oilvoice.com/n/Cameroon_2014_Bid_Round/672b4812de4f.aspx#gsc.tab=0>.

32 Deloitte, "The Deloitte Guide to Oil and Gas in East Africa: Where Potential Lies," 2013. <<http://www.deloitte.com/assets/Dcom-Kenya/Local%20Assets/Documents/The%20Deloitte%20Guide%20to%20oil%20and%20gas%20in%20East%20Africa.pdf>>; ACODE, "Uganda Oil and Gas Documentation Bureau", 2013. <<http://www.acode-u.org/ugandaoil.html>>.

Gabon	Perenco has plans to drill five more exploration wells offshore Gabon. Perenco was recently awarded two new offshore blocks, Mono and Nkouene. Arouwe Block will have exploration wells drilled in 2014.	Perenco
Ghana	Exploration and production activity has increased in Ghana since 2007 when the first commercial discoveries were made. Shallow water offshore exploration continues and there are several development projects underway. Further exploration wells are planned for May 2014.	Interoil, Kosmos Energy, Tullow Oil, Vitol E&P, Afren, Ophir
Guinea Bissau	The AGC Shallow license area (exploration license) covers 1,700km ² between Senegal and Guinea Bissau. Encouraging results from 3D seismic data acquired in 2010 have identified promising future prospects. The Sinapa oil discovery is estimated to have recoverable resources of 59 MMbbl. Untested prospects include the Atum prospect. Svenska has started well planning activities on the block for one exploration and one appraisal well at the Sinapa site.	Oryx Petroleum, Ophir, Svenska
Ivory Coast	A new 3D seismic survey has been undertaken in Block CI-508 and exploration drilling is likely to get underway in late 2014.	Vitol E&P
Kenya	Mbawa-1 (Block L8) offshore exploration encountered gas in 2012. Tullow farmed 6 blocks in the Turkana Rift in late 2010. Tullow made four oil discoveries in northern Kenya, in the Ekales-1 wildcat field, Ngamia-1, Etuko and Twiga South-1. Exploration of the Turkana Rift region is on-going.	Apache Corporation, Tullow, Africa Oil, Total, Anadarko, ENI,BG Group, FAR
Mozambique	Test drilling continues in Mozambique after the discovery of natural gas resources in 2010. The offshore Rovuma Basin has largely been the focus of exploration and production. Anadarko has drilled more than a dozen deepwater wells, with six significant natural gas discoveries. Eni has drilled two major natural gas discovery wells and appraisals of those wells in the Rovuma Area 4 Concession are ongoing. Further exploration is planned for 2014.	Mitsui & Co. Ltd, Anadarko, CNPC, PTTEP, ONGC Videsh, Oil India

Senegal	The AGC Shallow license area (exploration license) covers 1,700 km ² between Senegal and Guinea Bissau. In 2013, FAR and Cairn completed a farm-in agreement for three blocks offshore Senegal. Exploration wells are expected to be drilled in 2014.	Orynx Petroleum, Ophir, FAR, Cairn
Tanzania	BG group with Ophir are farming in to offshore Blocks 1, 3 and 4. Since 2011, BG Group and Ophir have drilled nine successful discovery wells in three offshore blocks. Further exploration is planned for 2014.	BG Group, Ophir, ExxonMobil, Statoil
Uganda	Albertine Graben region: The most lucrative fields are Maputa, Waranga, Giraffe 1, and Kingfisher. In 2011, Tullow signed contracts with Total and CNOOC to acquire a third of exploration areas 1, 2 and 3A. Exploration of this area continues.	Tullow, Total, CNOOC

Sources: see footnotes.³³

East Africa

Eastern Africa has recently shown itself to be a key sub-region primarily for natural gas, whereas West Africa is the key region for oil. A US Geological Survey estimates that offshore Mozambique and Tanzania could have more than 250 tcf of gas and an additional 14.5 billion bbl of oil.³⁴ Success rates have proven to be high offshore; between 2010 and 2012, almost 90 per cent of the wells drilled yielded discoveries. Given that North Africa

33 Vitol, "Vitol E&P holds an indirect 4% working interest in the Etinde production sharing contract (PSC), offshore Cameroon," 2013. <<http://www.vitol.com/cameroon.html>>; ERHC Energy, Operations, 2013. <<http://erhc.com/operations/>>; Oryx Petroleum, History, 2013. <<http://www.oryxpipeline.com/en/about-us/History.php>>; Cross Border Information, African Energy, "Congo Republic: CNOOC makes gas and oil discovery, more drilling planned," Issue 264, 24 October 2013. <<http://archive.crossborderinformation.com/Article/Congo+Republic+CNOOC+makes+gas+and+oil+discovery%2c+more+drilling+planned+%E2%80%A9.aspx?date=20131024&docNo=1&qid=1>>; Perenco, Gabon, 2013. <<http://www.perenco.com/operations/africa/gabon.html>>; Afren Plc, "Interim Management Statement," 31 October 2013. <<http://www.afren.com/download.axd?id=1770>>; Oryx Petroleum, History, 2013. <<http://www.oryxpipeline.com/en/about-us/History.php>>; FAR Ltd., "Guinea Bissau," 2013. <<http://www.far.com.au/guinea-bissau/>>; Vitol, "In May 2012 Vitol signed a Production Sharing Contract and acquired a 36% interest and operatorship of offshore block CI-508," 2013. <<http://www.vitol.com/ivory-coast.html>>; Mutegi M., "Tullow makes fourth oil discovery in Turkana," Business Daily, 26 September 2013. <<http://www.businessdailyafrica.com/Corporate-News/Tullow-makes-fourth-oil-discovery-in-Turkana/-/539550/2007780/-/d69n8hz/-/index.html>>; FAR Ltd., "Large equity positions in a fast emerging oil and gas margin," 2013. <<http://www.far.com.au/kenya/>>; US Energy Information Administration, Mozambique, April 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=MZ>>; Mitsui & Co. Ltd, Mozambique, 2013. <http://www.mitsui.com/jp/en/business/challenge/1199564_1856.html>; Oryx Petroleum, History, 2013. <<http://www.oryxpipeline.com/en/about-us/History.php>>. FAR Ltd., Senegal, 2013. <<http://www.far.com.au/senegal/>>; Wentworth Resources, "Exploration and Monetization in East Africa," 2013. <<http://www.wentworthresources.com/introduction.php>>; ACODE, "Uganda Oil and Gas Documentation," 2013. <<http://www.acode-u.org/ugandaoil.html>>.

34 US Energy Information Administration, "Emerging East Africa Energy Analysis Brief," 23 May 2013. <<http://www.eia.gov/countries/regions-topics.cfm?fips=eeae>>.

and other regions are relatively heavily explored, Eastern Africa offers an untapped territory. Gas finds off East Africa's coast have led to some predicting that the region could become the world's third largest exporter of natural gas in the long term.

In early 2012, crude oil was discovered in the remote onshore region of Turkana in Kenya, and it is expected that this region will see oil industry development as a result. In Uganda, some recent estimates place the proven reserves to be 3.5 billion bbl, an increase of 1 billion bbl from 2012 estimates due to oil block re-appraisals.³⁵ It is worth noting that many recent discoveries across East Africa still need to be assessed in terms of their commercial viability. Furthermore, many of the discoveries are located in countries with limited oil and gas infrastructure due to a lack of previous interest in the region.

In 2012, there were more than 50 wells completed in the East African region, which accounts for almost 50 per cent of the total volume of natural gas discovered globally through conventional exploration. The consumption of natural gas will continue to increase globally. Recent discoveries in Eastern Africa are likely to bolster the continent's position as an exporter, as major importers of LNG, notably Japan and South Korea, are located in the Pacific-Asia region that extends to East Africa in the LNG world map.³⁶ The average annual percentage of net trade of natural gas is forecast to increase by 4.7 per cent and 4.3 per cent in West and East Africa respectively.³⁷

2.2.4 Recent discoveries of oil and gas

Recent discoveries of oil and gas in sub-Saharan Africa are summarized in Table 2.5. The list is not exhaustive but it describes the main projects in the region. These projects will provide significant opportunities for international suppliers, as drilling equipment, compressors, power generators, rigs, pipelines and floating storage units are needed to explore and develop the oil and gas fields.

Table 2.5: Recent discoveries of oil and gas in sub-Saharan Africa

Country	Year of discovery	Description
Nigeria	2013	The Allied Energy PLC has confirmed that they found hydrocarbons in three depths while drilling in Oyo field offshore Nigeria. The well should be producing by mid-2014.
Kenya	2012	Tullow Oil announced an oil discovery in Block 10BB and 13T in Kenya. Drilling in the area continues although it has yet to be confirmed whether or not the find is commercially viable.

35 Reuters, "UPDATE 1-Uganda ups oil reserves estimate 40 pct to 3.5 bln bbls," 17 September 2012. <<http://www.reuters.com/article/2012/09/17/uganda-oil-idUSL5E8KH1MG20120917>>.

36 BP Statistical Review of World Energy, June 2013. <http://www.bp.com/content/dam/bp/pdf/statistical-review/statistical_review_of_world_energy_2013.pdf>; US Energy Information Administration, International Energy Statistics, Energy Outlook, 2012. <http://www.eia.gov/forecasts/ieo/more_highlights.cfm>.

37 BP Statistical Review of World Energy, June 2013. <http://www.bp.com/content/dam/bp/pdf/statistical-review/statistical_review_of_world_energy_2013.pdf>.

Congo	2013 2013	CNOOC and ORYX recently made discoveries off the coast of Congo. The discovery was made on the Haute Mer A license and spudded a second exploratory well. Eni group has found oil and gas offshore Congo with proven reserves of 600 MMbbl of oil and 700 bcf of gas in the Nene Marine-1 well. The find is located in the Marine XII Block.
Mozambique	2013	Eni group has found wet gas offshore Mozambique in Area 4. Estimates suggest there could be 5-7 tcf of gas. The group intends to drill three more wells in 2014.
Gabon	2013	Total group discovers Gabon's first deepwater pre-salt find. Preliminary analysis suggests that the hydrocarbons are natural gas with condensate.
Uganda	2006-2013	The first Ugandan oil discovery was made in the Lake Albert Rift Basin in 2006. Appraisals have increased proven crude oil reserves from zero in 2010 to 2.5 billion bbl in early 2013. Proven natural gas reserves are estimated at 500 bcf as of January 2013.
Ghana	2007-2013	Ghana discovered oil in 2007, since then 23 new discoveries have been made mainly offshore.
Ivory Coast	2013	In early 2013, Total announced a major discovery in the deepwater offshore Ivory Coast area, Block CI-100. This confirms the extension of reserves in the Tano Basin where Ghana's Jubilee Field is located. Total hopes that the Ivory Coast discovery will replicate the development seen in nearby Ghana. The Jubilee field is one of the largest in Africa with potential reserves surpassing 1.8 billion bbl.

Sources: see footnotes.³⁸

38 "Miocene oil confirmed in Oyo field offshore Nigeria," Oil & Gas Journal, 13 November 2013. <<http://www.ogj.com/articles/2013/11/miocene-oil-confirmed-in-oyo-field-offshore-nigeria.html>>; "CNOOC, Oryx have discovery off Congo (Brazzaville)," Oil & Gas Journal, 9 September 2013. <<http://www.ogj.com/articles/print/volume-111/issue-9a/general-interest/cnooc-oryx-have-discovery-off-congo-brazzaville.html>>; "Eni group finds oil, gas off Congo (Brazzaville)," Oil & Gas Journal, 8 August 2013. <<http://www.ogj.com/articles/2013/08/eni-group-finds-oil-gas-off-congo-brazzaville.html>>; "Eni group has wet gas find on Mozambique Area 4," Oil & Gas Journal, 3 September 2013. <<http://www.ogj.com/articles/2013/09/eni-group-has-wet-gas-find-on-mozambique-area-4.html>>; "Total group hits Gabon's first deepwater presalt find," Oil & Gas Journal, 19 August 2013. <<http://www.ogj.com/articles/2013/08/total-group-hits-gabon-s-first-deepwater-presalt-find.html>>; Deloitte, "The Deloitte Guide to Oil and Gas in East Africa: Where Potential Lies," 2013. <<http://www.deloitte.com/assets/Dcom-Kenya/Local%20Assets/Documents/The%20Deloitte%20Guide%20to%20oil%20and%20gas%20in%20East%20Africa.pdf>>; Viasat 1, "Ghana prepares new oil exploration law," 12 August 2013. <<http://www.viasat1.com.gh/v1/vnews/business.php?postId=1071>>; MercoPress: South Atlantic news Agency, "Six key Oil & Gas discoveries of 2013: who's worth owning?" 27 July 2013. <<http://en.mercopress.com/2013/07/27/six-key-oil-gas-discoveries-of-2013-who-s-worth-owning>>.

2.3 Mid- and downstream activity

Mid- and downstream activity remains limited across sub-Saharan Africa. Oil and gas discoveries tend to lead to the development of mid- and downstream infrastructure in the country. In Mozambique, for example, studies are currently underway for the development of LNG plants, gas transmission pipeline systems, gas-fired power stations, and a urea fertilizer plant since gas fields have been discovered. In addition, existing ports will be enhanced. However, the mid- and downstream oil and gas infrastructure does not always follow from discoveries, since exporting oil and gas rather than domestic consumption is projected to give the highest return to investors.

2.3.1 Refineries

Africa as a whole currently has the lowest continental refinery capacity globally at 3,123 Mbbl/d. This is less than half of South and Central America, the region with the next lowest capacity at 6,483 Mbbl/d.³⁹ In sub-Saharan Africa, there has been a slow increase between the early 1990s and 2012 from about 1,200 Mbbl/d to about 1,300 Mbbl/d (see Figure 2.9). Similar to other parts of the world, plants are often operating at much less than full capacity because of obsolete facilities.

Figure 2.9: Refinery operable capacity in sub-Saharan Africa (1992-2012)



Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm>>.

There are a total of 48 refineries on the entire continent, the majority of which were built in the 1970s and 1980s.⁴⁰ At least 10 refineries deemed uneconomic were closed

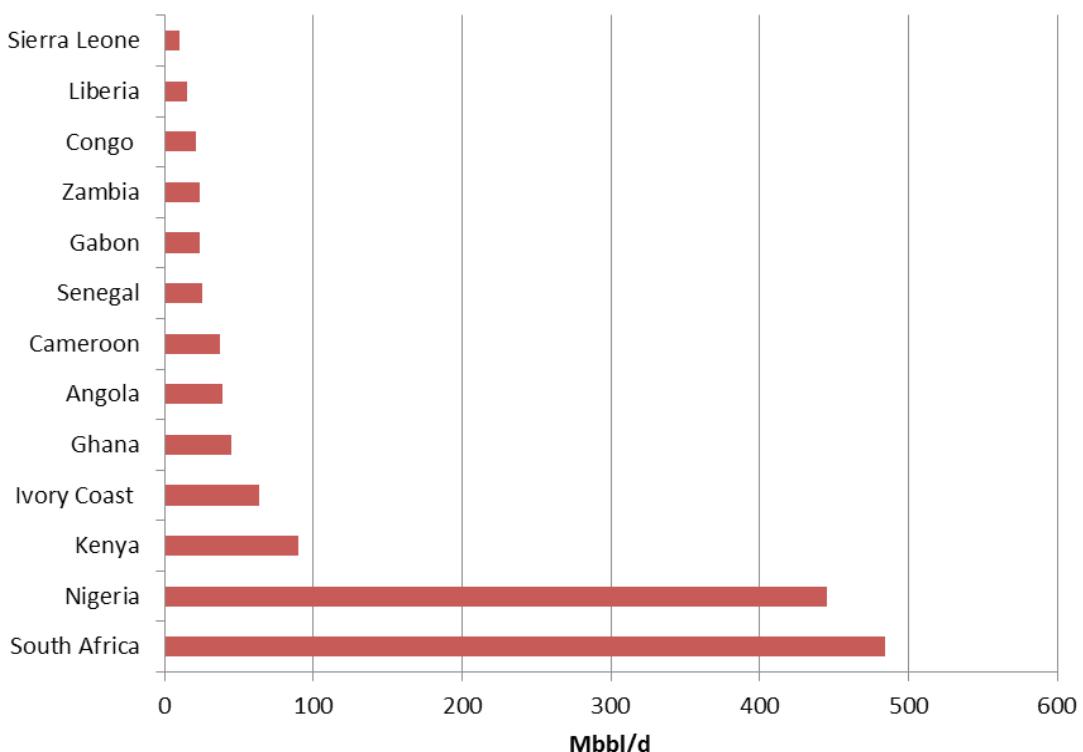
39 BP Statistical Review of World Energy, June 2013. <http://www.bp.com/content/dam/bp/pdf/statistical-review/statistical_review_of_world_energy_2013.pdf>.

40 African Development Bank and the African Union, "Oil and Gas in Africa," 2009. <<http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Oil%20and%20Gas%20in%20Africa.pdf>>.

permanently across the region between 1980 and 2003. Some of the oil refineries in Africa have closed down to become storage facilities due to their inefficient old equipment.

The Skikda facility in Algeria is currently the largest refinery in Africa, with a capacity of 300 MMbbl/d. The only major refining centres in sub-Saharan Africa are in South Africa and Nigeria (see Figure 2.10 and Table 2.6). The refinery capacity of each African country in Figure 2.10 has not changed (except in the case of Nigeria, where there was a slight decrease) since 2008. There have been no significant changes since the late 1980s and 1990s.

Figure 2.10: Refinery operable capacity by country in sub-Saharan Africa (2012)



Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm>>.

Table 2.6 displays all current sub-Saharan African refineries by country. The Societe de Raffinage de Zinder (Soraz-The Zinder Refinery Company) in Niger, inaugurated in 2011, is one of the few recently established refineries in sub-Saharan Africa. Most refineries date back to the 1970s and 1980s with some built as long ago as the 1950s.

Table 2.6: List of refineries in sub-Saharan Africa

Country	Refinery plant	Owner/operator	Nominal Capacity (Mbbl/d)

Angola	Luanda Refinery	Total, Fina Petroleos de Angola (PETRANGOL), S.A.R.L., Sonangol	40
Cameroon	Sonara (Societe Nationale de Raffinage)	Total, Exxon Mobil, Shell, Government of Cameroon, Burkina Government	45
Chad	Djarmaya refinery	CNPC, Government of Chad	20
Congo (Republic of)	Coraf refiner	Government of Congo	21
Cote d'Ivoire	SIR Refinery	Total, Shell, Exxon Mobil, Chevron Texaco, PETROCI	60
Cote d'Ivoire	Societe Multinationale des bitumes	Shell, Societe Ivorienne de Raffinage, Bourse des valeurs d' Abidjan	9
Djibouti	Djibouti Oil Refinery	Al Brooge Security Company	70
Gabon	Sogara Refinery Gabon	Total, ExxonMobil, Shell, Agip, Government of Gabon	21
Ghana	Tema Refinery	Ghana National Petroleum Corporation	43
Kenya	Kenya Petroleum Refinery Ltd	Government of Kenya, Shell International, Caltex Corporation, BP	70
Niger	Zinder Refinery	CNPC, Soraz	20
Nigeria	Kaduna Refinery	Nigerian National Petroleum Company	110
Nigeria	Port Harcourt I & II	Nigerian National Petroleum Company	210
Nigeria	Warri Refinery	Nigerian National Petroleum Company	125
South Africa	Chevref	Chevron-Texaco	110
South Africa	Enref	Petronas, Worldwide African Investment Holdings (Pty) Ltd	125
South Africa	Natref	Sasol Ltd, Total	109
South Africa	Sapref	Shell and BP South African Petroleum Refineries (Pty) Ltd	180
Senegal	Societe Africaine de Raffinage (SAR)	Total, Shell, Exxon Mobil, Government of Senegal	23

Sudan	Khartoum Refinery	CNPC, Sudan Ministry of Energy and Mining	51
Zambia	Indeni Refinery	Government of Zambia, Total	23
Total refinery capacity (nominal)			1,506

Sources: see footnotes.⁴¹

South Africa has four crude oil refineries as well as one synfuels plant and one gas-to-liquids plant. The refineries in South Africa have undergone expansion and upgrading since the 1990s. The largest refinery is the Sapref facility (180 Mbbl/d) in Durban which has been in operation for over 50 years. Also in Durban is the Engen refinery operated by Petronas, which has been operational since 1954 and is the oldest refinery in South Africa. The Chevref refinery, operated by Chevron, is based in Cape Town and produces gasoline, diesel, jet fuel, LPG, asphalt, fuel oil etc. The Natref (National Petroleum Refiners of South Africa) facility in Sasolburg was established in 1971 and is the only inland refinery in the country.

The world's largest coal liquefaction plant in Secunda, South Africa, produces synthetic fuels, diesel and other petro-chemical products from coal liquefaction.⁴² The PetroSA facility in Mossel Bay, South Africa, is a gas-to-liquids processing plant commissioned in 1992 and is one of the largest in the world.⁴³

There are several small refineries with capacity 20 Mbbl/d or less, located in the Congo, Cote d'Ivoire, Gabon, Senegal and Zambia. Ghana and the Ivory Coast are the only two countries that refine more than they produce. The Ivory Coast hopes to play a key role within West Africa as an energy hub focused on refining crude oil.⁴⁴ Towards the end of 2013, Ivory Coast received a USD 300 million loan from the World Bank's International

41 East African Community Secretariat, "Strategy for the Development of Regional Refineries," February 2008; US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm>>; "Luanda refinery processes 41,600 barrels of crude oil a day," ANGOP, 24 February 2012. <http://www.portalangop.co.ao/angola/en_us/noticias/economia/2012/1/8/Luanda-refinery-processes-600-barrels-oil-day,1a44c6d1-a923-4bde-b830-9803531866c5.html>; Daly, J., "Chinese Refinery in Chad Hits a Major Snag," Oil Price, 24 January 2012. <<http://oilprice.com/Latest-Energy-News/World-News/Chinese-Refinery-in-Chad-Hits-a-Major-Snag.html>>; "For Chad And China, Oil Spill Challenges An Already Faltering Partnership," International Business Times, 15 August 2013. <<http://www.ibtimes.com/chad-china-oil-spill-challenges-already-faltering-partnership-1386923>>; Omar, H.A., "Investors, officials discuss proposed Djibouti oil refinery," Sabahi, 1 November 2012. <http://sabahionline.com/en_GB/articles/hoa/articles/features/2012/11/01/feature-02>; REEEP Policy Database, "Djibouti," 2012. <<http://www.reegele.info/policy-and-regulatory-overviews/DJ>>; Niamey, "Niger refinery faces stocking, export problems," Reuters, 16 March 2012. <<http://www.reuters.com/article/2012/03/16/niger-refinery-idUSL5E8EG0SL20120316>>; Chevron, "South Africa Fact Sheet," April 2013. <<http://www-chevron.com/documents/pdf/southafricafactsheet.pdf>>; Petronas, "Engen Refinery," 2014. <<http://www.petronas.com.my/our-business/downstream/oil/oil-refining/Pages/engen-refinery.aspx>>; Total, "Naterf a the cutting edge of refining technology," <http://www.total.co.za/Os/ossouthafrica.nsf/VS_OPM/6558DB176585F1ABC1256F240055ADF8?OpenDocument>; Sapref, About Sapref, 2013. <<http://www.sapref.co.za/about/default>>.

42 Mangena, S., "Coal Gasification and Liquefaction – SA Experiences and Opportunities," Sasol, 6 November 2012, <<http://www.energy.gov.za/files/4thEUSouthAfricaCleanCoalWorkingGroup/SJ%20Mangena%20-%20SA-EU%20Clean%20Coal%20Working%20Group%20Meeting%20-final.pdf>>.

43 PetroSA, Operations and Refinery. <http://www.petrosa.co.za/innovation_in_action/Pages/Operations-and-Refinery.aspx>.

44 Avery, C., "Energy Memo: Côte d'Ivoire Oil Industry," IAS Group, April 2010. <<http://iasworldtrade.com/pdf/Cote%20dIvoire%20Oil%20Industry%20Memo.pdf>>.

Finance Corporation (IFC) and Societe Generale (SocGen) to import crude oil to be refined.⁴⁵

In East Africa, the only refinery is the Kenya Petroleum Refineries Limited plant in Mombasa. It started production in 2006 and currently processes about 1.6 MMtpa (or 32 Mbbl/d), only half of its nominal production capacity.

Sub-Saharan Africa has a refinery capacity of about only 1,500 Mbbl/d. This is approximately the same capacity of just three North African countries (Algeria, Egypt and Libya). Sub-Saharan Africa accounted for less than 1.4 per cent of the world's refinery capacity as of 2012.

More details on oil refineries are to be found in the section entitled 'Oil and gas infrastructure' in each country analysis.

2.3.2 Future oil refineries in sub-Saharan Africa

Refinery margins are low internationally, with refinery closures seen all over the world. Because of difficulties of competing with large scale refineries outside the region, the refinery business in sub-Saharan Africa is not commercially attractive, and often unviable. The region balances shortages of petroleum products with imports. The Organization for Economic Co-operation and Development predicts that USD 1.25 trillion will be invested in African energy between 2001 and 2030. It is likely that upstream exploration and production assets will remain the primary area of investment within both the oil and gas sectors.

In spite of the reliance on petroleum imports, increasing consumption of petroleum products and crude oil production capacity (particularly in West Africa) is expected to increase refinery capacity gradually over the next few years (see Table 2.7). The Dangote project in Nigeria is of particular interest. Aliko Dangote is a Nigerian businessman who, as the richest man in Africa, is investing USD 3.3 billion in the continent's largest oil refinery, petrochemical and fertilizer plant at an overall cost of USD 9 billion. The strategy for this huge investment is based on the example of the Jamnagar refinery in India. The Jamnagar refinery's design production capacity significantly exceeded actual demand when plans for the plant were drawn up. However, by the time the project had been completed and the refinery was operational, demand had risen to match the output of the refinery, leaving no room for competitors to enter the sector.⁴⁶ Nigeria's finance minister Ngozi Okonjo-Iweala believes that "Dangote's privately-owned refinery could be profitable if it is compensated for the difference between the market price and the lower subsidized price for fuel in Nigeria."⁴⁷ The perceived high-risk of this massive private investment in Nigeria is also tempered by the fact that the country has one of the fastest growing economies in Africa, and a population which is projected to reach 200 million by 2030. This growing population will undoubtedly increase the requirements for refined petroleum products in the country.

45 Abidjan, "Ivory Coast gets \$300 mln loan for refinery from World Bank, SocGen," Reuters, 4 December 2013. <<http://www.reuters.com/article/2013/12/04/ivorycoast-refinery-idUSL5N0JJ3QR20131204>>.

46 Wallis, W., "Aliko Dangote builds up manufacturing with \$9bn Nigeria refinery," Financial Times, 10 October 2013. <<http://www.ft.com/cms/s/0/66f9e0fc-2440-11e3-a8f7-00144feab7de.html#axzz2yJ7n7b9F>>.

47 Ibid.

Table 2.7: New oil refinery projects in sub-Saharan Africa

Country	Refinery	Capacity (Mbbl/d)	Status
Angola	Lobito	200	Expected completion in 2017.
Chad	North N'Djamena	60	Partially completed.
Cote d'Ivoire	Peace, Vridi Port	60	Construction began in 2007, unlikely to be completed, no progress made since 2008.
Equatorial Guinea	Mbini	20	Early stages of planning.
Ghana	New Alpha	200	Early stages of planning.
Guinea	Boffa	150	Partially completed.
Mozambique	Nacala	300	Early stages of planning for operation in 2015.
Namibia	Walvis Bay and Arandis	250	Expected completion in 2015.
Namibia	Shearwater	150	Early stages of planning.
Nigeria	Dangote	400	Expected completion in 2016.
Nigeria	Green field (Lagos, Kogi and Bayelsa)	750	Planned completion in 2016, though slow progress may delay this.
Nigeria	City View/Deanshanger	100	Proposed for 2014.
Nigeria	Mittal Nigeria	180	Proposed for 2015, on hold since early 2013.
Nigeria	Escravos	30	Partially completed.
Nigeria	Araromi	160	KBR contracted for design in 2010.
Zambia	Bwana Mkubwa	100	Construction of the refinery to begin in 2016.

Note: Oil refinery projects in Africa are especially prone to delays and cancellation. As such, it is likely that not all projects listed in Table 2.7 will be completed.

Source: see footnotes.⁴⁸

48 Accenture, "Contemporary approaches to asset investments in the energy industry," 2012. <<http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture-Contemporary-Approaches-Asset-Investments-Energy-Industry.pdf>>; "Ghana to get a second oil refinery," The New Ghanaian Online. <<http://mytngonline.com/ghana-to-get-second-oil-refinery/>>; Apa, "Foreign firms line up for Mozambique refinery project," StarAfrica, 3 October 2013. <<http://en.starafrica.com/news/foreign-firms-line-up-for-mozambique-refinery-project.html>>; Petrolland, Projects of Petrolland. <<http://>

2.3.3 LNG plants and terminals

Both existing and planned LNG plants and terminals in sub-Saharan Africa are listed in Table 2.8. It is notable that the majority are in the planning stage, underlining the projected increase and influence of LNG exports from this region to the global oil and gas market.

Although the global demand for LNG is rising, pressure to cut the price is expected before the market becomes saturated. The US, Australia and Russia are all looking to become large international suppliers of LNG and are targeting the Asian market which Mozambique and Tanzania also hope to sell to. These countries are set to be producing LNG well before 2020, whereas Mozambique and Tanzania would be fortunate if their LNG facilities were ready by then, given the fact that it took 11 years for Angola to build their Soyo LNG facility. Some African LNG plants have been built more quickly than this: the Equatorial Guinea LNG plant began construction in 2003 and was completed in 2007, setting the benchmark for the construction of such facilities. However, there remain serious concerns that the price of LNG will drop due to ample supply before the midstream industry in East Africa is developed enough to take advantage of the significant reserves it has to offer.⁴⁹

Table 2.8: Existing and planned LNG facilities in sub-Saharan Africa

Country	Capacity	Date of Operation	Description
Angola	5.2 MMtpa	2013	The Angola LNG plant was recently completed at a cost of USD 10 billion. The LNG processing facilities are located in Soyo, north of Luanda. The plant has LNG storage facilities, LPG and condensate storage and a loading jetty that can accommodate ships up to 210 m in length.
Cameroon	3.5 MMtpa	Expected 2017	Cameroon has a GDF Suez LNG project which will consist of a production plant 30 km south of Kribi and which will be connected to a national gas transportation network.

www.petrolland.com/index.php?option=com_content&view=article&id=48&Itemid=18; "Nigeria's Dangote sings deal to build oil refinery," BBC News, 4 September 2013. <<http://www.bbc.co.uk/news/world-africa-23960843>>; "Nigeria and China sign \$23bn deal for three refineries," BBC News, 14 May 2010. <<http://www.bbc.co.uk/news/10116945>>; Boyo, H., "Will more and efficient refineries reduce fuel prices?" Punch, 24 February 2014. <<http://www.punchng.com/opinion/viewpoint/will-more-and-efficient-refineries-reduce-fuel-prices/>>; "ONGC-Lakhsmi Mittal JV give up Nigerian oil block," The Economic Times, 29 January 2013. <http://articles.economictimes.indiatimes.com/2013-01-29/news/36616167_1_signature-bonus-omel-opl-285>; Mutumweno, N., "Zambia to get a new oil refinery in 2016," Oil Review Africa, January 2014. <<http://www.oilreviewafrica.com/downstream/downstream/zambia-to-get-a-new-oil-refinery-in-2016>>.

⁴⁹ "Bigger battle awaits Mozambique, Tanzania in East Africa gas race," Reuters, 10 October 2013. <<http://uk.reuters.com/article/2013/10/10/energy-gas-africa-idUKL5N0HM2Q020131010>>.

Equatorial Guinea	3.7 MMtpa (Train 1)	2007	<p>The EG LNG plant was built at the Punta Europa site on the north west side of Bioko Island near the capital, Malabo. The project was the fastest LNG project from initial conception to final investment decision. Construction was completed in early 2007 and the plant made its first deliveries of LNG in mid-2007.</p> <p>A second liquefaction train is planned for this plant with the an overall potential of 20 MMtpa LNG production. Equatorial Guinea also has an LPG plant.</p>
Ghana	450 MMcf/d	Expected 2016	Ghana has recently stated that it intends to build a floating LNG terminal off its coast so that it can receive imported gas to produce electricity.
Kenya	N/A	Expected 2017	Kenya intends to build an offshore LNG facility for importing, handling and storage. An associated project is the plan to lay an underground pipeline from the LNG import terminal to feed KenGen's thermal power plants in Mombasa.
Mozambique	20 MMtpa	Expected 2018	<p>The operators of Mozambique's offshore Area 4 and the Government of Mozambique have put forward plans to develop an LNG export plant. This is to be located in Cabo Delgado province in northern Mozambique, also known as the Ruvuma Basin LNG Land. Initially the Mozambique LNG plant would consist of four 5 MMtpa liquefaction trains with expansions scheduled to increase capacity up to 50 MMtpa. Mozambique LNG intends to deliver the first LNG cargoes in 2018.</p> <p>A floating LNG plant in Block 4 is also being considered in order to begin LNG production at an earlier date.</p>
Nigeria, Brass Island	22 MMtpa 4 MMtpa (LPG)	Unknown	The planned LNG plant will be constructed on the Island of Brass, Bayelsa State in the central Niger Delta area but engineering work is still ongoing and there is currently no timeline for project development.

Nigeria, Bonny Island	22 MMtpa 4 MMtpa (LPG)	1999	The Bonny Island facility has six operational trains. The LNG plant has a capacity of 22 MMtpa of LNG and 4 MMtpa of LPG. The plant has four LNG storage tanks, a common fractionation plant to process LPG, three condensate storage tanks, four refrigerated LPG tanks, two LNG export jetties, one LPG and condensate export jetty, 24 LNG tankers dedicated to serve the plant, as well as two material off-loading jetties and a residential area that covers over 2 km.
South Africa	1.2 MMtpa	Expected 2018+	South Africa's national oil company PetroSA intends to build an offshore LNG terminal. They are in the early stages of planning and recently contracted an oil and gas engineering firm to produce a front end engineering design study. The project will not be operational until at least 2018, and PetroSA is still looking for partners.
Tanzania	N/A	2021-2022	Statoil and BG Group are combining their efforts to develop a USD 20-30 billion LNG production and export terminal onshore in Tanzania. Lindi has been chosen as the potential site for a two train LNG plant and test drilling has taken place. Ongoing appraisals are pushing the design and development of the LNG facility forward.

Source: see footnotes.⁵⁰

50 Angola LNG, "Angola LNG sells its first cargo," 28 January 2014. <<http://www.angolalng.com/project/AngolaLNGFirstLPGCargo.htm>>; GDF Suez, Cameroon LNG, 2012. <<http://cameroonlngproject.com/documents/cameroun-lng-project-en.pdf>>. Equatorial Guinea LNG Holding Ltd, 2013. <<http://www.eglng.com>>; Obulutsa, G., "Ghana plans LNG power project to generate 1,500MW by 2016," Reuters Yahoo, 11 September 2013. <<http://news.yahoo.com/ghana-plans-lng-power-project-generate-1-500mw-152336263--finance.html>>; Senelwa, K., "Kenya to build LNG storage plant," The East African, 17 November 2012. <<http://www.theeastfrican.co.ke/business/Kenya-to-build-LNG-storage-plant-/2560/1622588/-/2clf7d/-/index.html>>; Mozambique LNG, Proven Experience, 2013. <<http://www.mzlng.com>>. Nigeria LNG Ltd., Our LNG, <<http://www.nlng.com>>; International Gas, "Global Forum for Gas Research to Meet in Paris." April 2007. <<http://www.igu.org/gas-knowledge/publications/igu-publications/publications/mag/apr07/p177-201.pdf>>; Total, The Brass LNG Project (Nigeria), 2013. <<http://total.com/en/energies-expertise/oil-gas/exploration-production/projects-achievements/lng/brass-lng>>; Burkhardt, P., "PetroSA Plans South Africa LNG Terminal of Up to \$510 Million," Business Week, 18 July 2013. <<http://www.businessweek.com/news/2013-07-18/petrosa-plans-south-africa-lng-terminal-of-up-to-510-million>>; Holter, M., "Statoil, BG to Build Tanzania LNG Plant in Lindi, Minister Says," Bloomberg, 14 February 2014. <<http://www.bloomberg.com/news/2014-02-14/statoil-bg-to-build-tanzania-lng-plant-in-lindi-minister-says.html>>; Chopping, D., "Statoil's Zafarani Reservoir Offshore Tanzania Successfully Tested," Nasdaq, 3 March 2014. <<http://www.nasdaq.com/article/statoils-zafarani-reservoir-offshore-tanzania-successfully-tested-20140303-00063>>.

Nigeria is currently the largest sub-Saharan African exporter of natural gas by a significant margin, and they opened their Bonny Island production and export terminal in 1999, well in advance of other sub-Saharan African nations (see Table 2.8 and Section 2.4.2). There are also plans for a further facility in Nigeria at Brass Island. While the completion date for this project is currently unknown, the LNG power generation facility expected to open in neighbouring Ghana in 2016 is likely to increase demand for cheap natural gas in the region. Due to the proximity of Nigeria and the ease of export to Ghana through the existing West African Gas Pipeline (WAGP) infrastructure, it is likely that the Brass Island facility will be completed sooner rather than later. West Africa, with the greatest production capacity and the largest proven reserves of natural gas, is predicted to dominate sub-Saharan LNG production until at least 2040.⁵¹

2.3.4 Chemical plants and other major gas users

There is a general trend in the sub-Saharan African countries to diversify the economy and make greater use of the derivatives from the buoyant oil and gas sector. Increasingly, efforts are made not only to export the raw materials, but to refine or process them into final products such as petroleum products, electricity and fertilizers for the export and/or domestic market.

Depending on the discount rate used to compare different options for gas resources, exporting LNG is often found to be the best option for the national economy. However, if investors for gas transmission pipelines (and the distribution network) can be found, gas can be used domestically, including the associated gas which is currently flared. In particular, the power and industrial sectors can reduce their current dependency on imported petroleum products, which is often the largest outlay of foreign export earnings, with the creation of jobs for the local population as a further benefit. Similarly, natural gas can be used for domestic users such as industrial estates. In addition, in most countries, where gas is available, a urea fertilizer plant is often commercially viable. Given the prominence of agriculture for sub-Saharan African economies and, particularly, the fact that agriculture employs the majority of the workforce in many of those countries, developments in fertilizer plants help to further develop that sector. Table 2.9 and Table 2.10 provide a list of major chemical and gas-fired power development projects in sub-Saharan Africa, many of which will need upgrades in the transmission lines in order to fully reap the benefits of the developments.

Table 2.9: Major chemical plants in sub-Saharan Africa

Country	Name of plant	Type	Production (tpa)	Status
Angola	Lubango	Fertilizer	1.6 million	Operation expected to begin in 2014.
Equatorial Guinea	AMPCO	Methanol	1 million	In operation.

⁵¹ US Energy Information Administration, "Oil and Natural gas in Sub-Saharan Africa," 1 August 2013. <http://www.eia.gov/pressroom/presentations/howard_08012013.pdf>.

Ghana	Nyakrom	Fertilizer	1 million	Construction of plant almost complete; awaiting gas supply.
Kenya	N/A	Fertilizer (Nitrogen)	400,000	Interested parties engaged in talks.
Mozambique	Beira	Fertilizer (Urea, Ammonia)	600,000	Operation expected to begin in 2016.
	GigaMethanol BV	Methanol	7 million	Operation expected to begin in mid-2016.
Nigeria	Indorama Eleme Petrochemical Plant	Fertilizer (Urea, Ammonia, NPK)	1.4 million	Operation expected to begin after Q4, 2015 when construction is due to be completed.
	The Delta Methanol Plant	Methanol	850,000	Operation expected to begin in 2015.
South Africa	Sasolburg	Nitric Acid	73,000	In operation.
	Sasolburg	Methanol	140,000	In operation.

Sources: see footnotes.⁵²

52 "Angola: City of Lubango to Have Manure and Fertilizers Plant," AllAfrica, 28 June 2013. <<http://allafrica.com/stories/201306281395.html>>; Atalantic Methanol Production Company LLC, 2014. <<http://www.atlanticmethanol.com/operations.html>>; Quandzie, E., "Indian fertilizer plant waiting for Ghana gas supply," George Appiah, 24 August 2014. <<http://news.georgeappiah.com/2013/08/24/indian-fertilizer-plant-waiting-for-ghana-gas-supply/>>; Okulo, L., "MEA eyes deal for fertiliser factory," The Star, 26 August 2013. <<http://www.the-star.co.ke/news/article-133522/mea-eyes-deal-fertiliser-factory>>. "Foreign Investors target Mozambique's expanding manufacturing sector," Voices of Mozambique, 19 March 2013. <<http://voicesofmozambique.com/tags/fertilizer>>; Insitec, "Mozambique's Industrial Revolution." <<http://www.insitec.co.mz/en/negocios-e-participacoes/gigamethanol/>>; Kalejaye, K., "Nigeria to construct \$1.2bn fertilizer plant," Vanguard, 28 May 2013. <<http://www.vanguardngr.com/2013/05/nigeria-to-construct-1-2bn-fertilizer-plant/>>; Chemicals-Technology, 21 November 2012. <<http://www.chemicals-technology.com/news/news/gulf-guinea-ggoex-methanol-plant-nigeria>>; Omnia, "Our new nitric acid complex," 2014. <<http://www.omnia.co.za/pebble.asp?relid=2523>>; Sasol, "Operations - Sasol Solvents," 2014. <<http://www.sasol.com/about-sasol/chemical-cluster/sasol-solvents/operations-sasol-solvents>>; Cambray, G., "Methanol synthesis in South Africa," Science in Africa, June 2007. <<http://scienceinafrica.com/old/index.php?q=2007/june/methanolproduction.htm>>.

Table 2.10: Major gas-fired power plants in sub-Saharan Africa

Country	Name of plant	Type	Capacity (MW)	Status
Angola	Futila	Combined Cycle Gas-turbine	70	In operation.
	Luanda	Open Cycle Gas-turbine	148	In operation.
	Luanda (floating stabiliser)	Open Cycle Gas-turbine	96	In operation.
Cote d'Ivoire	Centrale CIPREL	Open Cycle Gas-turbine	210	In operation.
	Azito	Combined Cycle Gas-turbine	288 (to be increased to 427)	In operation. (Increased capacity due to be in operation by early 2015).
Equatorial Guinea	Punta Europa	Gas – unknown type	28	In operation.
Ghana	Takoradi 2	Combined Cycle Gas-turbine	220 (to be increased to 340)	In operation. (Increased capacity due to be in operation in late 2014).
Kenya	Dongo Kundu	Combined Cycle Gas-turbine	800	36 companies expressed interests in bidding for the development.
Mozambique	Ressano Garcia	Gas-turbine	175	Operation expected to begin in 2014.
	Maputo	Combined Cycle Gas-turbine	100	Construction due to be complete in 2018.

Nigeria	Geregu II	Open-Cycle Gas turbine	434	In operation.
	Egbin	Gas-fired steam turbine	1320	Partially operational at 994 MW.
	Ughelli	Simple cycle gas turbine	900	Partially operational at 360 MW.
	Sapele I	Gas-fired steam turbine and Simple cycle gas turbine	1020	Partially operational at 200 MW.
Republic of the Congo	Côte Matève	Combined Cycle Gas-turbine	300	In operation.
South Africa	Sasolburg	Gas engine	140	In operation.
Tanzania	Mtwara	Gas – unknown type	400	Construction expected to begin in 2014.
	Ubungo II	Open-Cycle Gas turbine	100	In operation.

Note: List is not exhaustive.

Source: see footnotes.⁵³

53 Industcards, "CCGT Plants in Africa - other countries," 28 September 2013. <<http://www.industcards.com/cc-africa.htm>>; Global Energy Observatory, "Luanda OCGT Power Plant," <<http://globalenergyobservatory.org/geoid/42580>>. Amafule, E., "Jonathan inaugurates 434MW Geregu power plant." Punch. 4 October 2013. <<http://www.punchng.com/business/business-economy/jonathan-inaugurates-434mw-geregu-power-plant/>>; Isolux Corsan, "Electrical power plant on floating stabilisers (Luanda) – Angola," <<http://www.isoluxcorsan.com/en/project/electrical-power-plant-on-floating-stabilisers-luanda.html#descripcion>>; Global Energy Observatory, "CIPREL OCGT Power Plant." <<http://globalenergyobservatory.org/geoid/42574>>; "Globeq's new power plant in Côte d'Ivoire to commence operations in 2015," African Review of Business and Technology, 22 November 2013. <<http://www.africanreview.com/energy-a-power/power-generation/globeq-s-new-power-plant-in-cote-d-ivoire-to-commence-operations-in-2015>>; "Electrical Power in Equatorial Guinea – Overview," MBendi, 28 March 2014. <<http://www.mbendi.com/indy/powr/af/eq/p0005.htm>>; "TAQA breaks ground on gas-fired power plant expansion in Ghana," PennEnergy, 11 April 2013. <<http://www.pennenergy.com/articles/pennenergy/2013/04/taqa-breaks-ground-on-gas-fired-power-plant-expansion-in-ghana.html>>; Munda, C., "Ketraco seeks experts for gas and coal power lines," 24 Tanzania, 26 November 2013. <<http://www.24tanzania.com/ketraco-seeks-experts-for-gas-and-coal-power-lines/>>; Wahito, M., "62 firms interested in Kenya coal, LNG plants," Business & Tech, 25 October 2013. <<http://www.capitalfm.co.ke/business/2013/10/62-firms-interested-in-kenya-coal-lng-plants/>>; "Finland's Wärtsilä to operate power plant in Mozambique," Club of Mozambique, 01 May 2013. <<http://www.clubofmozambique.com/solutions1/sectionnews.php?secao=mining&id=28478&tipo=one>>; "Mozambique: Gas-Fired Power Station Inaugurated," AllAfrica, 30 November 2012. <<http://allafrica.com/stories/201212010005.html>>; "Mozambique: Japan to Finance New Maputo Power Station," AllAfrica, 14 January 2014. <<http://allafrica.com/stories/201401140941.html>>; "Geregu Generation Company Limited," NIPP Transaction. <<http://www.nipptransactions.com/ndphc-generating-companies/geregu-ii-power-station/>>; Egbin Power Plc, <<http://www.egbinpowerplc.com>>.

In an attempt to boost agricultural output and enhance food security in the country, Nigeria is planning to build the Indorama Eleme Petrochemical Plant, which will be the world's largest single-stream gas-to-urea plant.⁵⁴ Geregu II power station was also inaugurated in October 2013 in the country as one of the 10 plants under the National Integrated Power Projects (NIPP), aimed at stabilising the electricity supply in Nigeria.⁵⁵ In 2013, Nigeria's Federal Government began to put every power plant built under the project up for sale, which could lead to an increase in the NIPP power plants' output. It is likely that international companies will have to invest in improving the gas supply to the power plants and the transmission network, which is currently still state owned, in order to maximise the generation and distribution of electricity.

In Mozambique, Ressano Garcia Thermal Power station is currently under construction and due to finish in mid-2014.⁵⁶ Upon completion, it is expected to reduce the country's dependence on electricity import from South Africa's power market, particularly peak hour supply, which is prohibitively priced. In addition, Japan is to provide the country with a loan of JPY 17.27 billion to build a new combined-cycle gas-fired power plant in Maputo. The agreement for the scheme was signed during the visit of Japanese Prime Minister Shinzo Abe to Mozambique in January 2014.⁵⁷ In Mozambique, a urea fertilizer plant has also been proposed by a Japanese company.

The facilities described above are only a few examples of mid-/downstream projects proposed which have developed in the wake of natural gas discoveries. As the domestic sub-Saharan population and economies grow, there will be an increased need for these new power and chemical plants.

2.3.5 Oil and gas pipelines

Depending on the material, there are three types of pipeline: crude oil, petroleum products and gas pipelines. Table 2.11 and Table 2.12 give details of existing and proposed oil and gas pipelines in sub-Saharan Africa. These pipeline projects often cost several billions of dollars, such as the USD 5 billion proposed domestic gas pipeline in Mozambique. They present significant opportunities for international suppliers, particularly in the upgrade or expansion of the pipelines. The development of pipeline infrastructure is necessary to

egbinpower.com>; Transcorp Ughelli Power, "Transcorp, GE partner to improve power generation in Nigeria," 30 January 2014. <<http://www.ughellipower.com/press-release>>; Ogunlesi, T... "Nigeria's dysfunctional state power plants set to go private," Financial Times, 7 May 2013. <<http://www.ft.com/cms/s/0/1b93eb52-b326-11e2-95b3-00144feabdc0.html?siteedition=uk#axzz2xjET7t63>>; "CCGT Plants in Africa – other countries," Industcards, 13 October 2012. <<http://www.industcards.com/cc-africa.htm>>; "South Africa's first gas-fired power plant fully operational," Sasol, Press Release, 10 July 2013. <<http://www.sasol.co.za/media-centre/media-releases/south-africa-s-first-gas-fired-power-plant-fully-operational>>; "Construction on Mtwara gas plant project starts," Daily News, 7 July 2013. <<http://www.dailynews.co.tz/index.php/local-news/19592-construction-on-mtwara-gas-plant-project-starts>>; "CCGT Plants in Africa – other countries," Industcards, 13 October 2012. <<http://www.industcards.com/cc-africa.htm>>; Global Energy Observatory, "CIPREL OCGT Power Plant." <<http://globalenergyobservatory.org/geoid/43733>>

⁵⁴ Kalejaye, K., "Nigeria to construct \$1.2bn fertilizer plant," Vanguard, 28 May 2013. <<http://www.vanguardngr.com/2013/05/nigeria-to-construct-1-2bn-fertilizer-plant/>>.

⁵⁵ Amaefule, E., "Jonathan inaugurates 434MW Geregu power plant," Punch, 04 October 2013 <<http://www.punchng.com/business/business-economy/jonathan-inaugurates-434mw-geregu-power-plant/>>.

⁵⁶ Club of Mozambique, "Finland's Wärtsilä to operate power plant in Mozambique," 2013. <<http://www.clubofmozambique.com/solutions1/sectionnews.php?secao=mining&id=28478&tipo=one>>.

⁵⁷ "Japan funds \$174 mln new Mozambique gas-fired power plant," Yahoo News, 14 January 2014. <http://www.engineeringnews.co.za/article/japan-funds-174m-new-mozambique-gas-fired-power-plant-2014-01-14/rep_id:3182>.

transport large volumes of oil and gas products within Africa, whilst avoiding the slow, dangerous and poor quality rail and road infrastructure across much of the continent.

Thus far, the oil and gas pipeline infrastructure in sub-Saharan Africa is one of the most underdeveloped in the world. Existing pipelines consist of mostly old oil pipelines used to import crude oil and petroleum products to landlocked nations for domestic consumption from ports of neighboring coastal African nations.

As more oil and gas exploration and production is taking place in deepwater offshore locations, higher quality and technically demanding subsea pipelines will be required to transport the oil or gas to onshore midstream facilities. Pipeline projects are often related to mid- or downstream projects, such as refineries, LNG plants or gas-fired power stations (see Sections 2.3.1 to 2.3.4). Many of the planned pipeline projects are executed with a view to further additions in the future. For example, the oil pipeline from Kenya to Uganda could be extended to Burundi and Rwanda at a later date.

In Nigeria, the level of sabotage and theft from the pipeline network is extremely high. Because of this, large doubts have been cast upon some large-scale projects such as the Trans-Saharan Gas Pipeline, which could open up a large, easily accessible export market for sub-Saharan African natural gas.

Table 2.11: Major existing and proposed oil pipelines in sub-Saharan Africa

Country(ies)	Status	Description
Tanzania, Zambia	Operational since 1968. New pipeline proposed to begin construction in 2016.	The Tazama crude oil pipeline runs from Dar es Salaam in Tanzania to Ndola in Zambia. The pipeline has the capacity to pump 600,000 tpa, but has performed poorly leading to erratic fuel supply in Zambia. As a result, Zambians have largely been relying on truck imports from South Africa, and Zambia is considering replacing the pipeline, in conjunction with the construction of a refinery in Ndola. Furthermore, if Zambia builds an oil refinery along the route of the pipeline, they will also consider building a petroleum products export pipeline to Tanzania and Democratic Republic of Congo. Construction of the new refinery will begin in 2016.
Angola, Zambia	2016	Zambia and Angola signed a USD 2.5 billion deal to construct a petroleum products pipeline from Angola to Zambia, once the Lobito refinery has been completed. The pipeline's projected capacity would be 200 Mbbl/d with Zambia receiving 80 Mbbl/d.
Cameroon, Chad	Operational since 2003	The Chad-Cameroon crude oil pipeline runs from three oil fields in south-western Chad to a floating offshore export facility in Cameroon.

Mozambique, Zimbabwe	Operational since 1966	The Feruka petroleum products pipeline runs from Beira in Mozambique to Harare in Zimbabwe. A parallel pipeline is being considered by the Zimbabwean Government to increase the transmission capacity.
Kenya, Uganda	2016	The pipeline will allow Uganda to import petroleum products from Kenya. The 352 km pipeline will connect to the pre-existing pipeline that runs from Nairobi to Eldoret. The pipeline may extend to Burundi and Rwanda in the future.
Kenya, Uganda	2019+	Construction of the proposed 1,400 km crude oil pipeline from Hoima in western Uganda to Kenya's Lamu port along the coastline will cost at least USD 4 billion. The pipeline would go through difficult terrain.
Nigeria	Various	Nigeria has an extensive network of both crude oil and petroleum product pipelines. The main pipeline extends over 1,000 km, stretching from Kaduna to Maiduguri, and connecting to other petroleum product pipelines in Kaduna. The Trans-Nigeria pipeline is a crude oil pipeline running from Warri in a northerly direction to Kaduna. Nigeria has four crude oil pipelines and seven petroleum product pipelines.
Kenya	1978	Kenya has nearly 900 km of petroleum product pipelines. The main pipeline runs from the coastal Mombasa to the capital Nairobi where the pipelines fork to Eldoret and Kisumu.
Gabon	Various	Gabon has four crude oil pipelines, situated along the coast, two of which come from the inland Rabi Kounga oil field.
Tanzania	Planned	The Tanzanian Government hope to build the Kigoma crude oil pipeline from Kigoma to Mwanza in the future after a failed contract agreement.

South Africa	1955 onwards	Petroleum product pipelines were the first type to be built in South Africa and have been expanded twice. A crude oil pipeline running from Durban to Gauteng, where Johannesburg is located, was established soon after. One petroleum product pipeline was converted in to a crude oil pipeline in 1996. Transnet Pipelines are currently working on a multi-product pipeline in the opposite direction to the main crude oil pipeline but construction is running behind schedule.
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Source: see footnotes.⁵⁸

Table 2.12: Major existing and proposed gas pipelines in sub-Saharan Africa

Country(ies)	Status	Description
Nigeria, Benin, Togo, Ghana	Operational since 2011	West African Gas Pipeline (WAGP) transports gas from the Escravos region in Nigeria to Benin, Togo and Ghana. It was the first regional gas transmission system in sub-Saharan Africa. The pipeline was damaged by a ship's anchor in 2012 but repairs were completed by July 2013.
Tanzania, Kenya	Feasibility study conducted	The Mtwara pipeline is intended to transport gas from Dar es Salaam in Tanzania to Tanga and Mombasa in Kenya according to the East African Community. It is unknown whether construction will go ahead.
Nigeria, Cameroon, Equatorial Guinea	Under review	A third LNG train's construction at Equatorial Guinea's Punta Europa site depends upon whether gas import pipelines can be built from Nigeria and Cameroon. The project would cost USD 3 billion.
South Sudan, Kenya	Planned	The Lamu (Lapsset corridor) pipeline that Toyota Tsusho intends to construct will connect South Sudan to the Kenyan port of Lamu.

58 Theodora, Africa Pipelines Map. <http://www.theodora.com/pipelines/africa_oil_gas_and_products_pipelines_map.html>; Mutumweno, N., "Zambia to get a new oil refinery in 2016," Oil Review Africa, January 2014. <<http://www.oilreviewafrica.com/downstream/downstream/zambia-to-get-a-new-oil-refinery-in-2016/>>; "Zambia and Angola sign \$2.5bn Oil deal," Lusaka Times, 16 April 2012. <<http://www.lusakatimes.com/2012/04/16/zambia-angola-sign-25bn-oil-deal/>>; Kadzere, M., "Zimbabwe: Drag Reducers Increase Feruka Pumping Capacity," AllAfrica, 8 January 2014. <<http://allafrica.com/stories/201401080210.html>>; IFC, Chad-Cameroon Pipeline Project. <http://www.ifc.org/wps/wcm/connect/region_ext_content/regions/sub-Saharan+africa/investments/chadcameroon>; Hydrocarbons Technology. Kenya-Uganda Oil Pipeline, Kenya. <<http://www.hydrocarbons-technology.com/projects/kenya-uganda-oil-pipeline/>>; Senelwa, K., "Tough terrain pushes Kenya-Uganda oil pipeline cost to \$4 billion," The East African, 28 December 2013. <<http://www.theeastafican.co.ke/business/Kenya-Uganda-oil-pipeline-cost-to--4-billion--/2560/2127536/-/jat4grz/-/index.html>>; Kenya Pipeline Company, FAQs. <<http://www.kpc.co.ke/faqs?showall=1&limitstart=>>>; McLaughlin, P., "Durban/Gauteng pipeline still three years behind," ParlyReport, 21 April 2013. <<http://parlyreportsa.co.za/energy/durbangauteng-pipeline-still-three-years-behind/>>

Nigeria, Niger, Algeria	Under review	A Memorandum of Understanding has been signed by Nigeria, Niger and Algeria for the Trans-Saharan Gas Pipeline joint venture. The pipeline would transport gas from Nigeria to Algeria with the aim of also exporting to the EU. A feasibility study was completed in 2006, but progress on the project has been slow. Security issues in all three countries have contributed to uncertainty for potential developers as the pipeline would be an ideal target for terrorist groups operating in the region. The project's future remains uncertain (see Sections 3.1.1 and 3.2.4).
Mozambique, South Africa	Operational	Sasol owns a gas pipeline over 800 km long, running from the Temane/Pande field to Secunda in South Africa. The pipeline was built in an agreement between the two national governments to link Mozambique natural gas production with South Africa's high demand. Both countries have an option to acquire a combined 50 per cent ownership.
Mozambique	Planned	A Memorandum of Understanding between Gigajoule International Ltd and Empresa Nacional de Hidrocarbonetos, Mozambique's national oil company, was signed in early 2013 to do a joint study and, if deemed feasible, construct a gas pipeline from Cabo Delgado to Maputo. The study should be ready by mid-2014.
Nigeria	Under construction	Shell Petroleum Development has contracted the Otumara-Saghara-Escravos Pipeline in Nigeria. The 41 km pipeline will collect processed associated gas from Western Niger Delta and send it through the Escravos Lagos system for use within the domestic market.
Tanzania	Under construction	China and Tanzania have signed a USD 1 billion loan agreement to build a gas pipeline in East Africa from Dar es Salaam, the capital, to Mtwara in the south of the country.
Ghana	Under construction	Ghana National Petroleum Corporation (GNPC) proposed the Natural Gas Transportation and Processing Project in order to transport and process gas from the Jubilee Field. Ghana's pipeline from the Jubilee field to Takoradi is delayed until mid-2014. This is a subsea pipeline. Ghana Gas is also constructing a 75km natural gas pipeline in western Ghana.
South Africa	Operational	The gas pipeline was converted from a line previously used for liquids. It runs from Secunda to Durban via Empangeni.

Source: see footnotes.⁵⁹

2.4 Oil and gas exports

Sub-Saharan Africa is well placed to become a major global exporter of both oil and gas. With its global geographical location, it has relatively straightforward sea access to the current major oil importers in Asia-Pacific, North America and Europe, and the major gas importers in Europe, Eurasia and Asia.⁶⁰ Production and infrastructure will increase and improve as the potential of the proven reserves is realized, and this will likely bring enhancements to the port and export facilities as the region seeks to capitalize on their resources on the global market.

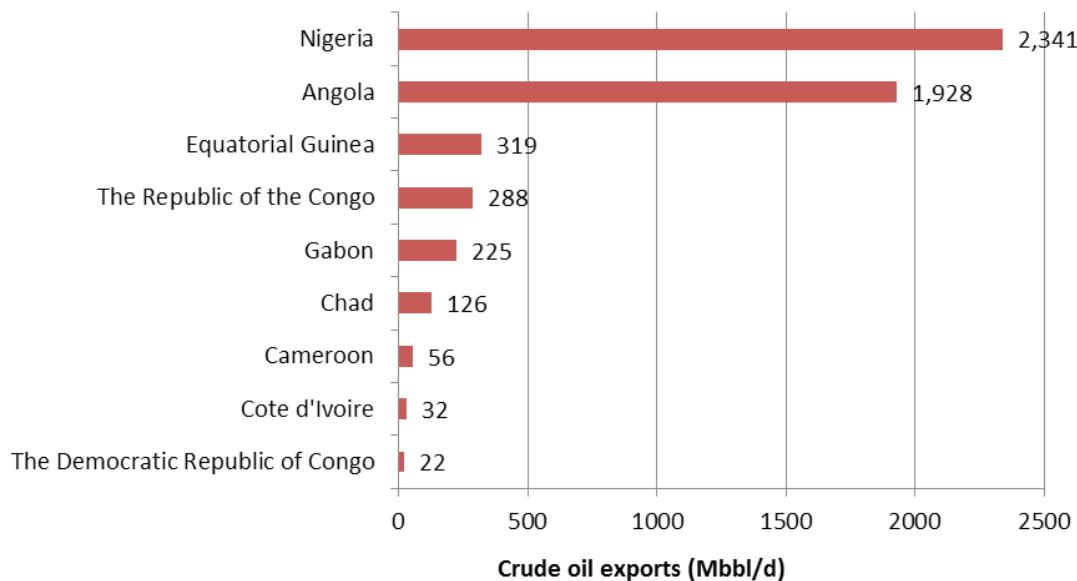
2.4.1 Oil exports

Within sub-Saharan Africa, the dominance of Nigeria and Angola in the crude oil export market is clear. In 2012, Nigeria and Angola ranked fifth and eighth, respectively, in the list of the world's largest exporters of oil.⁶¹ Using statistics from 2010, Figure 2.11 compares these countries with the other major sub-Saharan crude oil exporters.

59 West Africa Gas Pipeline Authority, WAGPCO, 2013. <<http://41.204.59.211:81/>>; Bala-Gbogbo, E., "West African Gas Pipeline Co. Resumes Deliveries After Repairs," Bloomberg, 18 July 2013. <<http://www.bloomberg.com/news/2013-07-18/west-african-gas-pipeline-co-resumes-deliveries-after-repairs.html>>; "Trans-Saharan gas pipeline to reach Europe in 2015," Business Intelligence, 22 February 2009. <<http://www.bi-me.com/main.php?id=31951&t=1&c=33&cg=4&mset=>>; Oredein, O., "Nigeria to review Trans-Saharan gas pipeline plan," Hydrocarbon Processing, 5 September 2013. <<http://www.hydrocarbonprocessing.com/Article/3203147/Nigeria-to-review-Trans-Saharan-gas-pipeline-plan.html?ArticleId=3203147>>; NNPC, "Trans-Sahara gas pipeline project viable - GMD," 2013. <<http://www.nnpcgroup.com/PublicRelations/NNPCinthenews/tabid/92/articleType/ArticleView/articleId/172/TRANS-SAHARA-GAS-PIPELINE-PROJECT-viable--GMD.aspx>>; Hydrocarbons Technology. Equatorial Guinea LNG Project, Bioko Island, Punta Europa, Equatorial Guinea. <<http://www.hydrocarbons-technology.com/projects/bioko-lng/>>. "Fenosa, E.ON To Build Second LNG Train in Gulf of Guinea," Downstream Today, 22 February 2008. <http://www.downstreamtoday.com/news/article.aspx?a_id=8873>; Endeavour, "Pande Gas Pipeline, Mozambique," 2013. <http://endeavor-energy.com/case_studies/pande-gas-pipeline-mozambique/>; Madamombe, I., "Pipeline benefits Mozambique, South Africa," October 2007. <<http://www.un.org/africarenewal/magazine/october-2007/pipeline-benefits-mozambique-south-africa>>; "Feasibility study for natural gas pipeline, Tanzania and Kenya," COWI, 16 February 2014. <<http://www.cowi-africa.com/menu/projects/Water-and-environment/Pages/Feasibilitystudyfornaturalgaspipeline,TanzaniaandKenya.aspx>>; Nkwame, M., "Tanzania: Mtwara Gas Pipeline to Connect EAC," AllAfrica, 24 January 2013. <<http://allafrica.com/stories/201301240061.html>>; Rehn, C., "Toyota to construct South Sudan-Kenya oil pipeline," Energy Global, 3 June 2013. <http://www.energyglobal.com/news/pipelines/articles/Toyota_to_construct_South_Sudan_to_Kenya_oil_pipeline-350.aspx#.UoS3zPmpW30>; "Gas to flow from Northern Mozambique," Pipelines International, June 2013. <http://pipelinesinternational.com/news/gas_to_flow_from_northern_mozambique/081716/>; Tubb, R., "2012 Worldwide Pipeline Construction Report," Pipeline International, January 2012. <<http://pipelineandgasjournal.com/2012-worldwide-pipeline-construction-report?page=show>>; Priestly-Eaton, H., "Ghana's West African natural gas pipeline delayed to 2014," Energy Global, 20 September 2013. <http://www.energyglobal.com/news/pipelines/articles/Ghanas_natural_gas_pipeline_delayed_to_2014.aspx#.UoS2R_mpW30>; "Gas pipeline construction on schedule – TPDC," IPP Media, 9 February 2014. <<http://www.ipppmedia.com/frontend/?l=64607>>; Transnet. Transnet Pipelines. <<http://www.transnet.net/Divisions/PipeLines.aspx>>.

60 Energy Realities, 2014. <<http://www.energyrealities.org/chapter/global-markets/item/oil-gas-imports-and-exports/erpE6CBB7551EB58B321>>.

61 US Energy Information Administration, Country Statistics, 2014. <<http://www.eia.gov/countries/index.cfm?topL=exp>>.

Figure 2.11: Major sub-Saharan Africa exporters of crude oil (2010)

Source: US Energy Information Administration, "Oil and Natural gas in sub-Saharan Africa," 1 August 2013. <http://www.eia.gov/pressroom/presentations/howard_08012013.pdf>.

It is evident that the Gulf of Guinea is the central area from which the majority of sub-Saharan crude oil is exported. In 2011, the oil supply from this region was equivalent to 40 per cent of the 27 European Union member countries' petroleum imports and 29 per cent of total US petroleum consumption. The Gulf of Guinea is therefore a major player within the international oil and gas market.⁶² Any discoveries in East Africa would most likely be used domestically or exported to the Asian markets.

In 2012, China was sub-Saharan Africa's largest crude oil importer followed by the US. Angola is currently a principal supplier of petroleum products for both China and the US. Angola provides almost 9 per cent of China's oil imports and many other sub-Saharan countries such as Congo, Equatorial Guinea and Nigeria provide China with crucial imports of oil.⁶³ On the whole, African oil exports to China are forecast to increase over the medium to long term as China is predicted to become the world's largest net importer of oil by 2020.⁶⁴ China's desire to diversify their oil imports within their energy security policy has contributed to the increasing desire for African oil imports.

Figure 2.12 displays the share of sub-Saharan African oil exports by end destination in 2007 and 2012. In 2012, China became the largest single export market for sub-Saharan African oil having more than doubled its share since 2007. India has had a similar

⁶² "Angola and the Gulf of Guinea: Towards an Integrated Maritime Strategy," Chatham House, November 2012. <<http://www.chathamhouse.org/sites/default/files/public/Research/Africa/1112conreport.pdf>>.

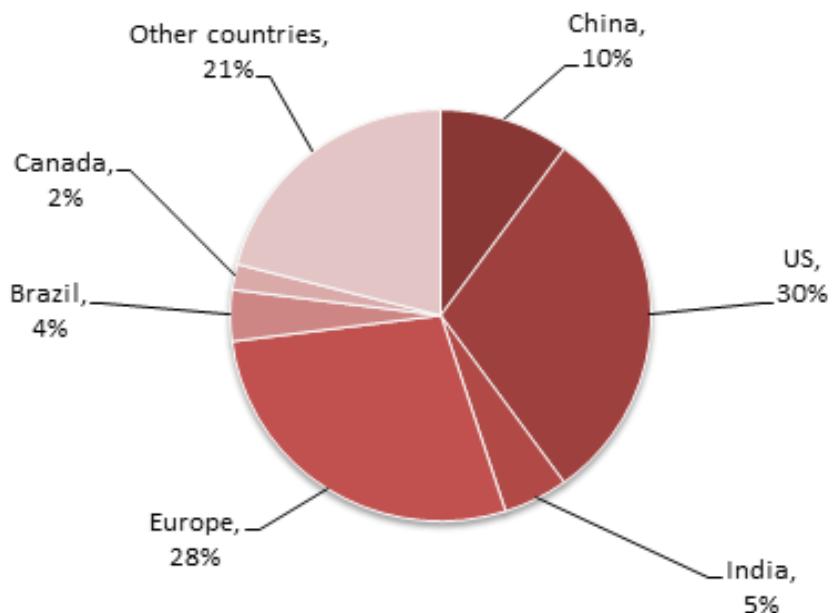
⁶³ "Oil and Gas in Africa: Africa's Reserves and Potential Prospects," KPMG, 2013. <<https://www.kpmg.com/Africa/en/IssuesAndInsights/Articles-Publications/Documents/Oil%20and%20Gas%20in%20Africa.pdf>>.

⁶⁴ US Energy Information Administration, Country Statistics, 2013. <<http://www.eia.gov/countries/index.cfm?topL=exp>>; "Oil and Gas in Africa: Africa's Reserves and Potential Prospects," KPMG, 2013. <<https://www.kpmg.com/Africa/en/IssuesAndInsights/Articles-Publications/Documents/Oil%20and%20Gas%20in%20Africa.pdf>>.

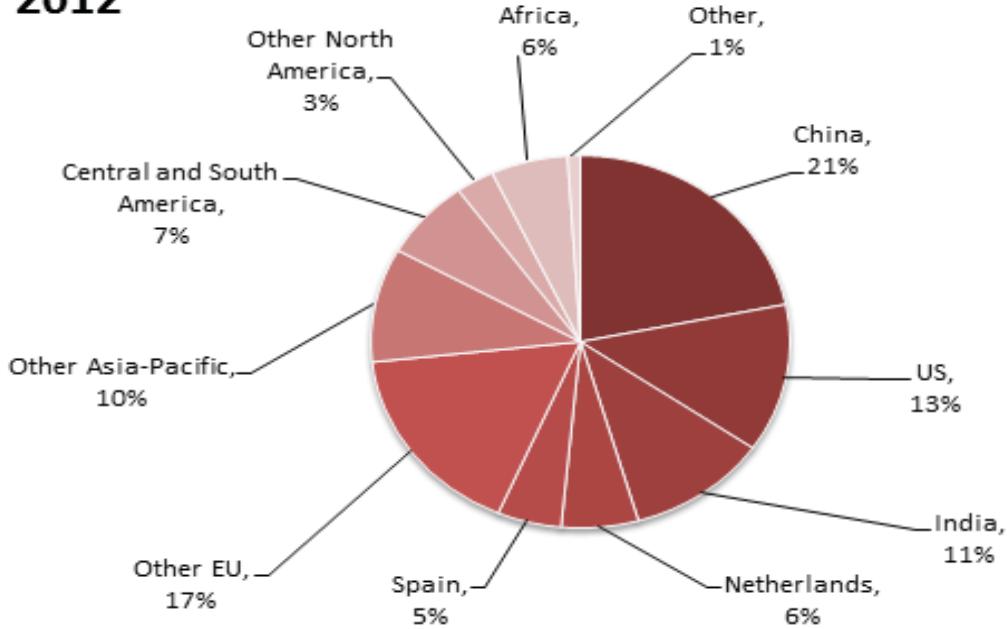
increase in percentage share, up from 5 per cent in 2007. These increases have come at the expense of the US's share. The US decline is attributable to the increase of its domestic oil production, especially shale oil.

Figure 2.12: Sub-Saharan Africa oil exports by destination (2007 and 2012)

2007



2012



Note: 'Europe' in 2007 includes Netherlands, France, Germany, Spain and Italy. Estimates include oil and lease condensate traded via tanker only; inland oil trades are not included.

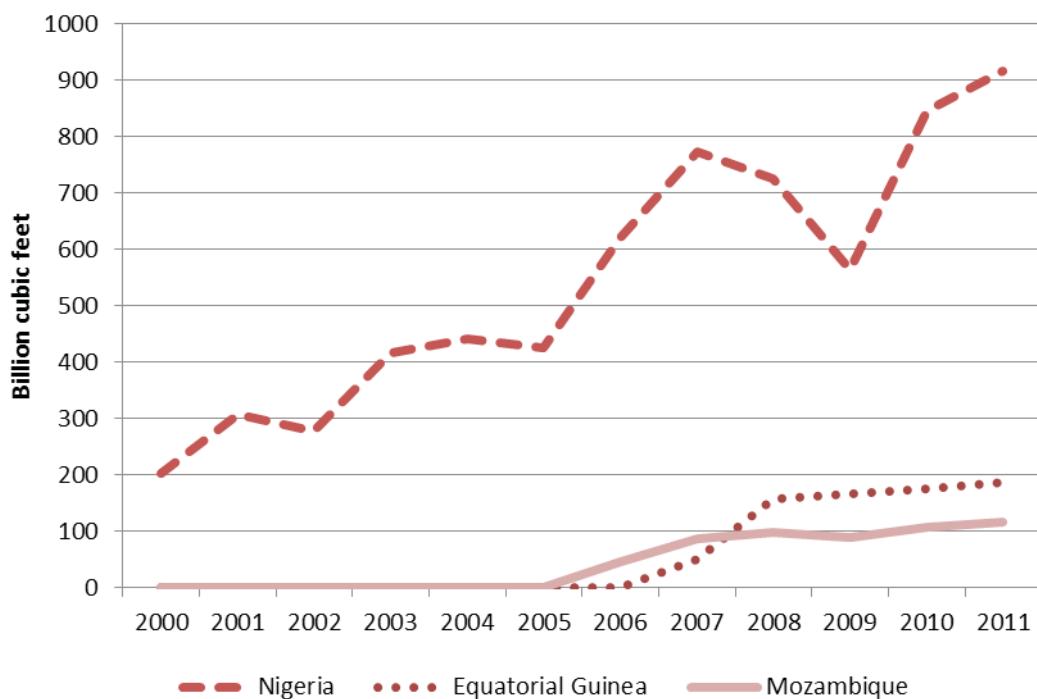
Source: KPMG, "Oil and Gas in Africa: Africa's Reserves and Potential Prospects," 2013. <<https://www.kpmg.com/Africa/en/IssuesAndInsights/Articles-Publications/Documents/Oil%20and%20Gas%20in%20Africa.pdf>>; US Energy Information Administration, "Oil and Natural gas in sub-Saharan Africa," 1 August 2013. <http://www.eia.gov/pressroom/presentations/howard_08012013.pdf>.

Oil contributes significantly to Africa's export earnings, in some countries accounting for over 95 per cent of export revenue.⁶⁵ Despite the significance of these earnings, sub-Saharan countries are dependent on foreign aid. Increasingly, the foreign aid is linked, directly and indirectly, to the region's hydrocarbon and mineral resources. China is the most notable example of this resource-linked aid policy. Japan has decided to double its aid to sub-Saharan Africa to USD 2 billion per year. After a recent visit to the region in early 2014 by Japanese Prime Minister Shinzo Abe, Japan committed USD 800 million to Mozambique, hoping to receive LNG and coal exports from that country.

2.4.2 Gas exports

Until 2013, only Nigeria, Equatorial Guinea and Mozambique exported natural gas. Nigeria holds vast natural gas reserves with the ninth largest supplies globally, and dominates gas exports from sub-Saharan Africa. Figure 2.13 represents the increase in dry gas exports by Nigeria, Equatorial Guinea and Mozambique between 2000 and 2011. The drop in export levels for Nigeria in 2008/09 was due to the closure of Shell's Soku gas facility as a result of both security and operational issues.⁶⁶ This facility has since reopened. Dry gas is exported from Nigeria to Benin, Togo and Ghana via the WAGP.⁶⁷

Figure 2.13: Sub-Saharan dry natural gas exporting countries (2000-2011)



Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm>>.

65 "Oil and Gas in Africa: Africa's Reserves and Potential Prospects," KPMG, 2013. <<https://www.kpmg.com/Africa/en/IssuesAndInsights/Articles-Publications/Documents/Oil%20and%20Gas%20in%20Africa.pdf>>.

66 US Energy Information Administration, "Nigeria," 30 December 2013. <<http://www.eia.gov/countries/cab.cfm?fips=ni>>.

67 US Energy Information Administration, "International Energy Outlook 2013," July 2013. <[http://www.eia.gov/forecasts/ieo/pdf/0484\(2013\).pdf](http://www.eia.gov/forecasts/ieo/pdf/0484(2013).pdf)>.

The majority of natural gas exports from sub-Saharan African countries are in the form of LNG. In 2012, Nigeria was the world's fourth largest LNG exporter, exporting an estimated 20 million tonnes. In that same year, Equatorial Guinea exported 3.8 million tonnes of LNG.⁶⁸ In 2013, Angola began exporting LNG and became the fourth sub-Saharan African country to export natural gas in some form. In 2012, 71 per cent of the world's LNG was consumed in the Asia-Pacific region, with Japan and South Korea accounting for a combined 52 per cent of global LNG imports as they try to move away from dependence upon nuclear energy.⁶⁹ Developments in the natural gas industry in East Africa are therefore well placed to cater for the Asia-Pacific region.

There have been preliminary proposals to develop a Trans-Saharan gas pipeline (TSGP) connecting sub-Saharan African gas reserves with Europe (see Section 2.3.5), although the prospects for the execution of this project are very small, at least in the foreseeable future. Recent discoveries of significant gas reserves in Mozambique are expected to increase its dry gas exports to South Africa which requires gas-to-fuel power plants which are more environmentally friendly than their current coal-fired plants.

2.5 Oil companies

2.5.1 African Petroleum Producers Association (APPA), and national oil companies (NOCs)

APPA is an inter-governmental organization established in 1987. Its establishment was spearheaded by Nigeria with the goal to become a platform for African petroleum-producing states to cooperate and collaborate. APPA has 18 member states, whose national oil companies are listed in Table 2.13. The member states account for almost all of Africa's oil and gas reserves and output. The organization has stated its commitment to working with regional and international organizations to fulfill its mandate, and provides support to member states in streamlining policies for their oil and gas sector, particularly where agreements have been made between African nations. An example of this is where member states have entered into a Memorandum of Understanding (MoU) with other member states, such as Ghana and Equatorial Guinea, who recently updated a bilateral agreement they originally signed in 2010. The current MoU will seek to offer mutual technical, financial and legal support to boost local content and maintenance of the oil and gas sector in both Ghana and Equatorial Guinea. Emerging oil and gas countries in East Africa, including Uganda, Kenya, Tanzania and Mozambique have not yet obtained membership.

68 "World LNG Report 2013," International Gas Union, 2013. <http://www.igu.org/gas-knowhow/publications/igu-publications/IGU_world_LNG_report_2013.pdf>.

69 "World LNG Report 2013," International Gas Union, 2013. <http://www.igu.org/gas-knowhow/publications/igu-publications/IGU_world_LNG_report_2013.pdf>.

Table 2.13: APPA members and national oil companies for major petroleum-producing countries in sub-Saharan Africa

Country	APPA Membership	National oil company
Algeria	Yes	National Company for the Research, Production, Transportation, Processing and Marketing of Hydrocarbons (SONATRACH)
Angola	Yes	Sociedade Nacional de Combustiveis de Angola (SONANGOL)
Benin	Yes	Office Beninois des Hydrocarbures (OBH)
Cameroon	Yes	Societe Nationale des Hydrocarbures (SNH)
Chad	Yes	Societe des Hydrocarbures du Tchad (SHT)
Democratic Republic of the Congo	Yes	La Congolaise des Hydrocarbures (Cohydro)
Egypt	Yes	EGPC (Egyptian General Petroleum Corporation)
Equatorial Guinea	Yes	GEPetrol and Sociedad Nacional De Gas de E.G (Sonagas)
Gabon	Yes	Societe National des Hydrocarbures du Gabon (SNHG)
Gambia	No	Gambia National Petroleum Company (GNPC)
Ghana	Yes	Ghana National Petroleum Corporation (GNPC)
Guinea-Bissau	No	Petrolifera de Guine Bissau (PetroGuin)
Ivory Coast	Yes	Societe Nationale d'OperationsPetrolières de la Cote d'Ivoire (PETROCI)
Kenya	No	National Oil Corporation of Kenya (NOCK)
Liberia	No	National Oil Company of Liberia (NOCAL)
Libya	Yes	NOC (National Oil Corporation)
Mali	No	Autorite pour la Promotion de la Recherche Petroliere au Mali (AUREP)
Mauritania	Yes	Societe Mauritanienne des Hydrocarbures (SMH)
Mozambique	No	Empresa Nacional de Hidrocarbonetos (ENH)
Namibia	No	National Petroleum Corporation of Namibia (AMCOR)

Niger	Yes	Societe Nigerienne de Produits Petroliers (SONIDEP)
Nigeria	Yes	Nigerian National Petroleum Corporation (NNPC)
The Republic of the Congo	Yes	Societe Nationale des Petroles du Congo (SNPC)
Senegal	No	Senegalese National Oil Company (PETROSEN)
Sierra Leone	No	Sierra Leone National Petroleum Company (SLNPC)
South Africa	Yes	The Petroleum Oil and Gas Corporation of South Africa (PetroSA)
Sudan	Yes	Sudanese Petroleum Corporation
Tanzania	No	Tanzania Petroleum Development Corporation (TPDC)
Togo	No	Soceiete Togolaise de Gaz
Uganda	No	Has stated plans to start a national oil and gas company under the Petroleum Exploration and Production Department
Zimbabwe	No	National Oil Company of Zimbabwe (NO CZIM)

Source: "Member country portraits," APPA, 2007. <<http://www.appa.int/en/pmbres/pmc.htm>>; Ojambo, F., "Uganda Draws Up Plan for National Oil Company to Steer Industry," Bloomberg, 06 June 2013. <<http://www.bloomberg.com/news/2013-06-06/uganda-draws-up-plan-for-national-oil-company-to-steer-industry.html>>. All information on other national oil and gas companies taken from company website unless otherwise stated.

2.5.2 International oil companies (IOCs)

Despite the current challenges facing the oil and gas sector in Africa, there are many international organisations involved across the region, primarily in upstream operations. IOCs including Shell, BP, Exxon, Total, Marathon, Tullow, ENI and Kosmos energy all operate in varying capacities on the continent. Tullow Oil invested more than USD 1.6 billion in Africa in 2012, over 80 per cent of the company's total global capital expenditure that year.⁷⁰ Tullow Oil's discovery of a new oil basin in Kenya, and their significant successes in Uganda and Ghana, has added to their increasing presence in the region. IOCs therefore appear willing to face the challenges presented by the African oil and gas sector and many IOCs have been highly successful at developing exploration and production (E&P) operations within the African context, with Africa forming an important part of their portfolio.

Table 2.14 shows some of the major IOCs and international companies involved in the upstream oil and gas sector in sub-Saharan Africa, giving an indication of the range of international involvement and the spread of international interest across the continent.

70 Tullow Oil, "Africa's leading independent oil company," Tullow Oil Plc 2012 Annual Report and Accounts. <http://www.tullowoil.com/files/pdf/tullow_ar_report_2012.pdf>.

Table 2.14: Major international companies involved in sub-Saharan African oil and gas

Company	Origin	Countries of Operation
Africa Oil	Canada	Kenya, Ethiopia and Somalia, Mali
Anadarko Corporation	USA	Kenya, Mozambique, Tanzania
Apache Petroleum Corp	USA	Kenya
Atlas Petroleum International Ltd	USA	Equatorial Guinea
Baker Hughes	USA	Angola, Nigeria, Congo, Gabon, Uganda,
Beach Petroleum	Australia	Tanzania
BG Gas	UK	Tanzania
Bowleven PLC	UK	Kenya, Cameroon
BP	UK	Angola, Nigeria, Multiple
CAMAC Energy Inc.	USA	Kenya
Canadian Natural Resources Ltd	Canada	Ivory Coast, Gabon
Chariot Oil and Gas Ltd	UK	Namibia, Mauritania
Chevron	USA	Nigeria, Angola
China National Offshore Oil Corporation (CNOOC)	China	Uganda, Mozambique, Others
China National Petroleum Corporation (CNPC)	China	Niger, Nigeria, Chad, Sudan, South Sudan
Cove Energy	UK	Mozambique, Kenya
Dodsal	Dubai	Tanzania
Dominion Petroleum	UK	Kenya, Tanzania, Uganda
Eni	Italy	Kenya, Tanzania, Uganda, Angola
Engen Oil	South Africa	Multiple
Enron Oil and Gas Resources Inc.	USA	Mozambique
ERHC Energy	USA	Mozambique, Kenya, Chad
Esso Exploration (subsidiary of ExxonMobil	USA	Angola, Nigeria

ExxonMobil	USA	Nigeria, Angola
FAR (First Australian Resources)	Australia	Cameroon, Kenya, Ghana
Gasol	UK	Mauritania, Ghana, Nigeria, Togo, Guinea
Great Wall	China	Chad, Niger, Kenya
Halliburton	USA	Multiple
Heritage Oil	UK	Tanzania, DRC
Hess	USA	Equatorial Guinea, Ghana
Hydro Oil and Energy (Norsk Hydro)	Norway	Angola
Leopardus Resources Limited	Canada/USA	Mozambique, South Africa, Zimbabwe
Marathon Oil	USA	Kenya, Equatorial Guinea
Marriot Drilling	UK	Kenya
Maurel and Prom	France	Tanzania, DRC, Gabon
MI Swaco Overseas	France	Multiple
Mitsui &Co Europe	Japan	Mozambique
Noble Energy	USA	Equatorial Guinea
Obax International	USA	Nigeria,
Ophir Energy	UK	Tanzania, Kenya, Equatorial Guinea
Orca Exploration Group	Canada	Tanzania
Origin Oil	UK	Kenya
Pacific Seabord Investments	Canada	Kenya
Pancontinental Oil and Gas	Australia	Kenya, Namibia
Petrobras	Brazil	Kenya, Tanzania and Mozambique
Petronas	Malaysia	Mozambique
Pioneer Natural Resources	USA	South Africa, Gabon
Premier Oil	UK	Kenya
Rift Energy Corp	Canada	Kenya
SACOIL HLDGS LTD	South Africa	Malawi, Botswana, Nigeria, South Africa, DRC

Sasol Petroleum International	South Africa	Mozambique
Schlumberger	France	Multiple
Sellier Energy	Canada	Mali
Shell	Anglo-Dutch	Angola, Nigeria,
Sinopec	China	Gabon, Angola, Nigeria and others
Statoil	Norway	Kenya, Tanzania, Mozambique, Angola, Multiple
Total	France	Kenya, Tanzania, Uganda, Angola, Multiple
Tullow Oil	UK & Ireland	Kenya, Ethiopia, Uganda, Multiple
Weatherford	Switzerland	Multiple

Note: This list is not exhaustive

Source: see footnotes⁷¹

2.6 International suppliers operating in sub-Saharan Africa

There are already a number of international suppliers who are involved in the sub-Saharan African oil and gas sector. For those companies, the financial benefits of involvement outweigh the well-documented risks, and many of them have been operating in the region for many years. There are also many international suppliers who are interested in possibilities in sub-Saharan Africa and who are monitoring the situation to try to identify an opportune moment for their involvement. Oil and gas and electricity are the main sectors of their interest, followed by transportation.

In this section, we briefly describe involvement in the oil and gas sector by several major plant manufacturers (heavy industry companies) and Engineering, Procurement and Construction (EPC) contractors from Europe, USA, Japan and South Korea. The companies described here have their own strong areas of expertise and they are not necessarily competing against each other. Despite the fact that Chinese oil companies are major investors in the oil and gas upstream assets in sub-Saharan Africa, no Chinese manufacturing suppliers have been identified as being major project suppliers, although there may be some who have been involved in pipeline installation. Activities of the Chinese oil and manufacturing companies in sub-Saharan Africa are summarized in Appendix I. The country analysis Chapters 3 to 8 give more detailed information about the activities of international oil and gas industry suppliers from various countries.

⁷¹ Obiero, E., "Companies in the oil & gas exploration scene in East Africa," The East African Energy Blog, 27 July 2012. <http://eafricaenergy.blogspot.co.uk/2012/07/companies-in-oil-gas-exploration-scene_8736.html>; A Barrel Full, "Aim Listed Oil and Gas Companies by Region, 6 March 2012. <<http://abarrelfull.wikidot.com/aim-listed-oil-and-gas-companies-by-region>>.

2.6.1 Major international suppliers

European suppliers

The largest European suppliers are shown below. Due to the proximity of European suppliers to Africa and their expertise in offshore oil and gas production, there are also many other European companies involved in the African oil and gas sector.

Siemens has been active on the African continent for more than 150 years and has undertaken projects specialising in various areas of the oil and gas value chain. The company has presence in the following sub-Saharan countries through its regional offices: Algeria, Angola, Cameroon, Democratic Republic of Congo, Ghana, Kenya, Mozambique, Nigeria, South Africa, and Tanzania.

Siemens divides the global market into three, and Africa is included in the Europe, CIS, Africa and Middle East group. Siemens operates in the oil and gas sector mainly through the Oil and Gas Division in the Energy Sector.⁷² In 2013, the Energy Sector's external revenue amounted to EUR 26.4 billion, which represented 35 per cent of Siemens's total revenue. Africa is listed as one of the growing markets of the Division, together with the US, the Middle East, Russia, and Brazil.⁷³

The Division has been actively carrying out M & A activities in order to be equipped with various oil, gas and subsea solutions that can be deployed to sub-Saharan Africa and other regions as required. Those solutions are related to water treatment for hydrocarbon production, no-flare and sour or acid gas management, Enhanced Oil Recovery, mid-sized LNG, unconventional gas, etc.⁷⁴

Sample projects of Siemens in sub-Saharan Africa include a large end flash gas (EFG) single-shaft compressor for an LNG plant in Nigeria and an electric-motor driven compressor for a Gas-to-Liquids/Coal-to-Liquids plant in South Africa. They have carried out a number of power plant projects.

ABB sees the sub-Saharan Africa as one of the most important strategic growth regions for the company. It identifies oil and gas as one of the priority growth areas, which is expected to grow faster than the projected global GDP of 4 percent.⁷⁵ ABB established two African sub-regions, Southern and Central, with South Africa and Egypt respectively serving as hub countries. South Africa holds 11 of sub-Saharan Africa's 29 ABB offices and sites. As per its 'Africa Strategy 2015', ABB plans to utilise the two hub countries South Africa and Egypt as a basis to expand its presence on the continent. Their target markets are the following 10 countries: Democratic Republic of Congo, Kenya, Angola, Tanzania, Mozambique, Nigeria, Ghana, Senegal, Cameroon, and Cote D'Ivoire.

In 2001, ABB obtained a USD 180 million EPC contract from Shell in Nigeria for the Bonga field's subsea production system, including the delivery of 29 conventional subsea trees and associated hardware to facilitate oil production from, and water injection into, the

72 "Siemens making inroads in the oil and gas sector," Pipeline, August 2013. <<http://www.energy.siemens.com/hq/pool/hq/industries-utilities/oil-gas/consulting/CES/Pipeline-Aug-2013.pdf>>.

73 Siemens, "Thinking for the long term, providing answers," Siemens, Annual Report 2013. <http://www.siemens.com/annual/13/en/download/pdf/Siemens_AR2013.pdf>.

74 Ibid., Pipeline, August 2013.

75 Poñe, C., "Sub Saharan Africa: ABB ready to seize growth opportunities," November 2011. <http://www02.abb.com/global/abbzh/abbzh250.nsf/0/aed073e28cee4d30c1257950002f7ae0/USD file/sub-Saharan-africa_carlos-pone.pdf>.

reservoir.⁷⁶ In another sample project in 2009, ABB provided engineering services and electrical equipment for the oil and gas trunk line pumps for Transnet Ltd. in South Africa to improve pipeline reliability, performance and energy efficiency.⁷⁷

Technip, a French oil and gas engineering company, known particularly for their subsea solutions, has offices in Angola, Nigeria, Ghana and South Africa. Their operations in Africa began in 1995. In Nigeria, the company operates through its subsidiary and two affiliate companies. In Ghana, the company has had an office since 2009 after winning a supply contract of subsea equipment, reinforcing its presence in West Africa.⁷⁸ The company currently has a logistic base in Port Harcourt in Nigeria, a spoolbase in Dande in Angola, and an umbilical plant in Lobito in Angola. As of June 2013, Technip had 750 employees in Africa, as compared to 500 a year earlier.⁷⁹ Africa accounted for 16 per cent of the total revenue of EUR 6.9 billion for the first three quarters of 2013.⁸⁰ Because of new offshore discoveries of oil and gas, the company expects continuous expansion of operations in Africa - including in Mozambique, where the company was awarded a Front End Engineering Design (FEED) contract for an offshore installation for Anadarko Mozambique Area 1, Limitada, in December 2012.⁸¹

Alstom is another major European supplier. Their business for the oil and gas sector is largely limited to power generation and network management solutions. They have offices in Algeria, Tunisia, Morocco, Nigeria, Libya, Senegal, Kenya and South Africa. Africa and the Middle East accounted for 15 per cent of their overall revenue in 2012 (USD 20 billion) with more than 3,000 employees in those two regions. In Algeria, Alstom is active in the fields of rail transport and power generation with 800 employees.⁸² In South Africa, the company has more than 450 employees and Alstom's turbines account for 80 per cent of the country's installed power generation capacity.⁸³

US suppliers

US manufacturing companies are behind European counterparts in terms of conducting business in sub-Saharan Africa. The US Government's current policy of refocusing on Africa may help US companies become more actively involved in the region.

GE supplies a large number of gas turbines found in gas-fired power stations in sub-Saharan Africa. For the oil and gas sector, GE provides advanced technology equipment and services, ranging from drilling and production, LNG pipelines and storage to industrial power generation, refining and petrochemicals.⁸⁴ GE is resetting their business in Africa.

76 "ABB wins US\$ 180 million subsea contract off Nigerian coast," ABB, 22 March 2014. <<http://www.abb.com/cawp/seitp202/c1256c290031524bc1256a1700401ed8.aspx>>.

77 "ABB wins Oil & Gas order in South Africa," ABB, 20 November 2014. <<http://www.abb.com/cawp/seitp202/c94b05b7a06f983585257674005cbc2c.aspx>>.

78 Technip, Technip in Ghana, 2014. <<http://www.technip.com/en/entities/ghana/profile>>.

79 Technip, "2012 Activity and Sustainable Development Report," p. 81. <http://www.technip.com/sites/default/files/technip/publications/attachments/2012_Activity_and_sustainable_development_report.pdf>; Technip, "Third Quarter 2013 Results," 2013. <http://www.technip.com/sites/default/files/technip/publications/attachments/Technip_3Q2013_Presentation_Website_with_annex.pdf>.

80 Ibid., "Third Quarter 2013 Results."

81 "Anadarko awards Mozambique FEED contracts to JGC, Chiyoda, Bechtel," Sweetcrudereports, 22 December 2012. <<http://sweetcrudereports.com/2012/12/22/anadarko-awards-mozambique-feed-contracts-to-jgc-chiyoda-bechtel/>>.

82 "Alstom in Algeria," Alstom, December 2012. <<http://www.alstom.com/Global/Group/Resources/Documents/Factsheets/Algeria.pdf>>.

83 "Alstom in South Africa," Alstom, August 2013. <<http://www.alstom.com/Global/Group/Resources/Documents/Factsheets/South-Africa.pdf>>.

84 GE Energy, "Energizing Africa," 2011. <http://www.ge-energy.com/content/multimedia/_files/>.

In sub-Saharan Africa, GE has key regional offices in Nigeria, Angola, Ghana, Kenya and South Africa.

GE's CEO, Jeffrey R. Immelt, stated in the company's 2012 Annual Report that sub-Saharan Africa had been 'off the radar' when he took over in 2001.⁸⁵ He further noted that GE could double its current USD 3 billion annual run rate in the region in the next few years.⁸⁶

In February 2014, GE and the US Federal Government signed a USD 1 billion deal on the establishment of a new manufacturing and assembly facility in Calabar, Nigeria, which includes USD 250 million for capital expenditures and the rest for incremental spending on local sourcing of goods and services. The deal will support the company's activities in both the oil and gas and power sectors.⁸⁷ Similarly, GE announced a joint venture with GLS Oil & Gas Angola Limited, where the company plans to invest USD 175 million to build a manufacturing facility in Soyo, province of Zaire, which will supply subsea equipment to the oil and gas sector in Angola.⁸⁸ These investments in production facilities are in line with the company's localization strategy.

GE's recent projects in the oil and gas sector include a USD 165 million contract to supply production equipment to Chevron's Lianzi project, situated offshore between Angola and the Republic of Congo, covering seven trees, nine subsea control modules, topside and subsea controls distribution equipment and vertical connection systems.⁸⁹

Bechtel, a global EPC contractor, has no branch offices or subsidiaries in sub-Saharan Africa, while it has a branch office in Egypt.

The company has been engaged in sub-Saharan Africa mainly through LNG projects.⁹⁰ In 2007, it completed an LNG project on Equatorial Guinea's Bioko Island off the west coast of Africa, which included refrigeration systems, compressors, condensers, storage tanks, suspension bridge, and marine facilities.⁹¹ Recently, it completed another LNG project in Angola, including an LNG train and associated facilities. In Mozambique, the company was awarded in December 2012 a FEED contract for the initial phase of the onshore LNG facility that will be built in the Cabo Delgado province in the northeast of the country.⁹² Other EPC contractors involved in FEED contracts for the same LNG project are JGC Corp and Chiyoda Corp of Japan, and CB&I of the US.

Bechtel has also been providing management and technical support to the Government of Gabon for its national infrastructure plan.⁹³

Japanese suppliers

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- downloads/GE_Energy_in_Africa.pdf >.
- 85 GE, "2012 Annual Report," p.3, 2012. <http://www.ge.com/ar2012/pdf/GE_AR12.pdf>.
- 86 Ibid.
- 87 Akinsuyi, Y. and Okafor, C., "Nigeria: FG Seals U.S. \$1 Billion Deal On Electric Manufacturing Assembly Plant," AllAfrica, 1 February 2013. <<http://allafrica.com/stories/201302010916.html>>.
- 88 "GE Oil & Gas Launches New Products," LNG World News, 28 January 2013. <<http://www.lngworldnews.com/ge-oil-gas-launches-new-products>>.
- 89 "GE Wins US\$165 Million Contract to Supply Subsea Technology for Chevron Oil Project in West Africa," GE, 30 October 2012. <<http://www.genewscenter.com/Press-Releases/GE-Wins-US-165-Million-Contract-to-Supply-Subsea-Technology-for-Chevron-Oil-Project-in-West-Africa-3c0f.aspx>>.
- 90 Bechtel, "The Bechtel Report 2013," 2013. <http://bechtel.com/2013_Bechtel_Report/BEC003_AR2013_rv34_WEB.pdf>.
- 91 Bechtel, Equatorial Guinea LNG, 2014. <http://www.bechtel.com/equatorial_guinea_lng.html>.
- 92 "Anadarko awards Mozambique FEED contracts to JGC, Chiyoda, Bechtel," Sweetcrudereports, 22 December 2012. <<http://sweetcrudereports.com/2012/12/22/anadarko-awards-mozambique-feed-contracts-to-jgc-chiyoda-bechtel/>>.
- 93 Bechtel, Gabon National Infrastructure, 2014. <<http://www.bechtel.com/gabon.html>>.

The Japanese manufacturers' involvement in sub-Saharan Africa is very limited despite the country having strong contenders in the area of heavy industries. They have a much stronger interest in the emerging markets in Asia than in Africa largely because of the proximity to the former. A recent decision by the Japanese Government to double its ODA to Africa to USD 2 billion a year may increase their interest in the region.

Mitsubishi Heavy Industries (MHI), similar to GE, has been involved in gas turbine power projects. MHI and Hitachi Heavy Industries' thermal power generation department merged in February 2014 into a company called Mitsubishi Hitachi Power Systems (MHPS). Africa is one of their target markets, with offices in Egypt, Morocco, Senegal and South Africa. The office in Morocco is focused on maintenance of small and medium-size equipment up to 100 MW and the office in Senegal is for industrial machinery only.⁹⁴

MHI has completed 14 gas turbine projects in Africa – six in Algeria, another six in Egypt, and two in Nigeria.⁹⁵ In November 2011, MHI, with Toyo Engineering and two other Japanese companies sealed an advanced contract for basic design for an ammonia/urea fertiliser plant in Soyo, Angola. Construction is expected to be completed by the end of 2015.⁹⁶ In Nigeria, MHI, along with Mitsubishi Corporation have been awarded the pre-FEED for the ammonia, urea and petrochemicals plant at Onne, Rivers State. The expected completion date of the project is 2016.⁹⁷

MHI acquired PW Power Systems Inc. (PWPS) of the US in 2013, which was awarded 25 MW x 20 unit gas turbine orders from the Algerian national electricity and gas company Sonelgaz Spa in December 2013.⁹⁸ Turboden, which specializes in the production of ORC (Organic Rankine Cycle) turbines that have smaller capacity and are widely used for biomass and geothermal generation, became an MHI group company in 2013. These acquisitions indicate MHI's strategy to expand its market share in the small and medium range turbines.⁹⁹

JGC Corporation has a regional office in Algeria, where they have been involved in both gas and power projects. In sub-Saharan Africa, they have affiliated companies in Lagos, Nigeria (JGC Nigeria Ltd.) and in Algiers, Algeria (JGC Algeria S.p.A).

As a leading EPC contractor for LNG plants, they took a major part in the Nigeria LNG Limited's (NLNG) Bonny Island Project, which began commercial operation in 1999, including the recent sixth LNG train which became operational in 2007. In Angola, the company took part in FEED for Soyo LNG project in Angola from 2005, with KBR of the US and Technip of France.¹⁰⁰ In Mozambique, the company has been awarded with Fluor Corporation, a FEED contract for an onshore LNG plant for Anadarko Mozambique Area

94 Mitsubishi Heavy Industries, Africa, 2014. <<http://www.mhi-global.com/network/area/africa.html>>.

95 Mitsubishi Heavy Industries "Worldwide experiences of Mitsubishi Gas Turbine," 2014. <http://www.mhi.co.jp/en/products/category/gas_turbin.html>.

96 "Mitsubishi Heavy Industries, Toyo Engineering, Sojitz, Sumitomo Sign Early Work Agreement for Fertilizer Plant in Angola," Mitsubishi Heavy Industries, 17 November 2011. <<http://www.mhi.co.jp/en/news/story/111117.html>>.

97 "Mitsubishi, Notore form joint venture for ammonia, urea complex in Nigeria," Hydrocarbon Processing, 24 April 2012. <<http://www.hydrocarbonprocessing.com/Article/3016926/Mitsubishi-Notore-form-joint-venture-for-ammonia-urea-complex-in-Nigeria.html>>; "Notore set to increase fertiliser production through joint development with Mitsubishi Corporation," Notore, 23 April 2012. <<http://www.notore.com/index.php/article/read/42>>.

98 "PW Power Systems to Provide La Société Algérienne de Production de Electricity (SPE) with 20 FT8® MOBILEPAC® Turbo generators," Mitsubishi Heavy Industries, 13 December 2013. <<http://www.mhi.co.jp/en/news/story/1312131746.html>>.

99 Turboden, 2014. <<http://www.turboden.eu/en/home/index.php>>.

100 "JGC/KBR/Technip JV Awarded FEED Services Contract for Angola LNG Project," JGC, 12 May 2005. <<http://www.jgc.co.jp/en/01newsinfo/2005/release/20050512.html>>.

1, Limitada.

The company has been involved in Escravos gas-to-liquids (EGTL) project in Nigeria. It was awarded an EPC contract as a part of a consortium with KBR and Snamprogetti of Italy consortium.¹⁰¹ The construction has been completed and the plant is expected to start operation in 2014.¹⁰²

The other two major Japanese EPC contractors for the oil and gas sector, Toyo Engineering Corporation and Chiyoda Corporation, have not entered into the sub-Saharan Africa market.

South Korean suppliers

The involvement of South Korean companies is limited largely to the construction of Floating Production Storage and Offloading (FPSO) units. Normally FPSOs are built in shipyards in South Korea before sailing to production sites such as those in sub-Saharan Africa.

Daewoo Shipbuilding and Marine Engineering have an office in Luanda, Angola, and joint ventures in with Paenal Yard in Angola and D&H Solutions and NIDAS Shipping in Nigeria.¹⁰³

The company built an FPSO for the Agbami Oilfield in 2007. Installed in Nigeria's largest deepwater development, the FPSO is one of the largest facilities of this type.¹⁰⁴ The topside was subcontracted to KBR.¹⁰⁵ Dresser-Rand of the US supplied three generator sets, three mechanical drivers and three compressors, which include GE's engine.

Samsung Heavy Industries has its regional office in Nigeria. They won a USD 3 billion turn-key contract in 2013 to supply an FPSO for the Bonga Development in Nigeria.

Hyundai Heavy Industries has a subsidiary company in Nigeria. The company built and delivered an FPSO for the Usan field in Nigeria in 2011.¹⁰⁶ The company, with its consortium partner, Technip, also built an FPSO for the Akpo field in Nigeria.¹⁰⁷

Daewoo Engineering & Construction have three sites in Nigeria. They completed an oil and gas facility for Shell's Gbaran/Ubie project located 100 km northwest of Port Harcourt in Nigeria in 2009.¹⁰⁸ Siemens delivered two compressor sets and three gensets, including 13-MW SGT-400 gas turbine drivers for the project.¹⁰⁹

101 Hydrocarbon Technology. Escravos Gas-to-Liquids Project, Niger Delta, Nigeria, <<http://www.hydrocarbons-technology.com/projects/escravos/>>.

102 "Spotlight on GTL – world-scale plants making progress," Gastech News, 5 November 2013. <<http://www.gastechnews.com/unconventional-gas/spotlight-on-gtl-world-scale-plants-making-progress/>>.

103 Daewoo Shipping and Marine Engineering, "2012 Annual Report," 2012. <http://www.dsme.co.kr/epub/iv/sr/ivsr010Q.do?is_type=earp>.

104 Chevron Crude Oil Marketing, Agbami (Nigeria), 2014. <<http://crudemarketing.chevron.com/crude/african/agbami.aspx>>.

105 Offshore Technology, Agbami Oilfield, Nigeria. <<http://www.offshore-technology.com/projects/agbami/>>.

106 Subsea IQ, Usan, 24 February 2012. <<http://subseaiq.com/data/Project.aspx?project_id=341>>.

107 "Technip awarded contract for the FPSO of the deepwater Akpo field in Nigeria," Technip, 9 May 2005. <<http://www.technip.com/en/press/technip-awarded-contract-fpso-deepwater-akpo-field-nigeria>>; Subsea IQ, Akpo. <http://www.subseaiq.com/data/PrintProject.aspx?project_id=252>.

108 "Daewoo Gets US\$800 Million Project from Nigeria," PlantKorea, 13 March 2003. <<http://www.plantkorea.com/en/portal/NewsView.asp?idx=17>>.

109 Siemens, "Venture," No. 6, January 2007. <<http://www.energy.siemens.com/hq/pool/hq/energy>>.

2.6.2 Strategies and practices

For major international suppliers, Africa has become one of their key markets. Their strategy in the region has been shaped within the context of their global strategy and in view of the business environment and other characteristics of the region. Based on interviews with those who have been involved in the oil and gas sector of sub-Saharan Africa, this section briefly explores the strategies and practices taken by international suppliers. Transcripts of sample interviews are given in Appendix II.

Geographical operations

In global operations, international suppliers tend to group Africa and the Middle East together. Some companies include India in the geographical group - not only because of the increasing presence of Indian companies in Africa but also because of their strategy of mobilizing Indian engineers and other professionals in Africa and localizing and producing their products for Africa in facilities in India. Shortage of skilled workers is one of the most serious problems international suppliers are facing in Africa. It should be noted that the shortage of skilled workers in the oil and gas industry is a global problem, not unique to Africa. The availability of a large number of qualified Indian professionals is increasingly seen as a solution to this problem.

Traditionally for international companies, South Africa has been their operational hub within sub-Saharan Africa, and often together with an office in Egypt, the entirety of Africa has been covered. Those issues which can't be dealt with by local offices are taken care of by the hub offices. The Maghreb market, which includes Tunisia, Algeria, Morocco, Libya, and Mauritania, has sometimes been dealt with by the operation in Europe.

In recent years, major international suppliers have been deploying offices and manufacturing facilities in sub-Saharan Africa. Figure 2.14 exhibits regional branch locations of the companies discussed in Section 2.6.1. Siemens, ABB and GE are the most active in terms of office and facility deployment. These companies have business opportunities in not only the oil and gas sector but also energy, water, health and other sectors. However, the extraction sector is a determinant of attracting the international suppliers to sub-Saharan Africa.

Figure 2.14: Distribution of branch office locations for major international manufacturers in Africa



Source: Base map from D-maps, 2014. <http://d-maps.com/carte.php?num_car=736&lang=en>. © London Research International, 2014

Local content laws and local companies

Many of the countries in sub-Saharan Africa are going through transitional issues and are still formulating their approach to doing business with international companies. Local content laws are becoming more widespread in the region, especially in relation to the extractive industries, and the potential for local populations to lose out.

However, local content laws can be challenging for international companies to meet,

especially when there is a lack of indigenous, skilled labour as found in Angola, which lacks the human capital following the civil war; and in Nigeria, where local content requirements are not in line with educational standards. In the short term therefore, it can be challenging for international companies to meet local content laws.

From a business point of view, international companies support the promotion of local content in the long term. The extra costs of bringing in international workers, including relocation packages, can be avoided by investing in an indigenous workforce. For many IOCs operating in Africa, it is their long term goal to have skilled people available locally. Local content is furthermore seen as an effective way of increasing the economic benefit received by the country in question.

In Angola, only Angolan companies are able to do business. International companies tend to incorporate local companies, through which they run operations in Angola. However, Chevron's recent strategy is to support and help Angolan companies grow. They have identified local companies that they want to help by producing local company development plans. This is indicative of a more general trend across sub-Saharan Africa in which, rather than establishing their own local company, international companies help local suppliers and businesses to grow to support their own operations. International suppliers will play an increasing role in supporting locally-based companies to grow through technical partnerships rather than incorporation. Joint ventures are highly desirable for doing business in Africa – local partners provide the know-how for business in that country and understand the webs of political power, and ethnic and family networks.

Investing in local content and local businesses are both long term commitments that an international company has to make. Because of the quick changes and instability that African countries can be susceptible to, these long-term commitments have to be accompanied with an understanding that planning with a level of fluidity is vital. The long-term plans can be made, but they must be open to change as business operations are in progress.

Through long-term investment in local people, local content demands can be fulfilled and the development of human resources in the oil and gas sector will develop. Presently, local companies in some countries pose a problem to international companies due to their poor business ethics. For example, many local suppliers in Equatorial Guinea demand full payment before receiving the goods. International suppliers and other IOCs approach business in sub-Saharan Africa with a higher degree of caution and careful judgement for each transaction they undertake.

Lessons learned

Although international manufacturers have learned that sub-Saharan African countries cannot be treated as the same, they have found similarities in terms of the business environment and practice. A summary of the key points in the regional analysis and some of the practices of IOCs and international suppliers in sub-Saharan Africa are as follows:

- The upstream oil and gas sector growth is matching the general economic growth of sub-Saharan Africa. Despite the growth of the shale gas industry which is expected to impact on deepwater field developments, there are a high number of FPSOs both active in, and planned for Africa.
- Nigeria is in a generally advanced stage in the development of its oil and gas sector. Other sub-Saharan African nations and IOCs can use Nigeria as a case study through which they can then understand the potential political, institutional, social and

economic difficulties sub-Saharan African nations face in developing the oil and gas sector, and they can then be better prepared to avoid or overcome those problems.

- There are upcoming licensing auctions for blocks in Kenya, Angola and Cameroon. High levels of exploration will continue in Africa, especially in East Africa, therefore more opportunities are likely to arise.
- The relationship between Africa and Asia in relation to oil and gas is important. China is providing high levels of investment in return for oil and gas exports from Africa as they attempt to secure future fuel requirements and diversify their supply sources. Japan and South Korea are key export markets for LNG. The importance of the US to Africa's oil and gas is on the decline due to domestic discoveries of shale oil.
- Sub-Saharan Africa has been slow to develop the mid- and downstream oil and gas sector but activity is starting to increase and domestic markets are beginning to grow
- The pipeline infrastructure is severely under-developed.
- Sub-Saharan Africa's weakness on the oil refinery front reflects a global trend in the unprofitability of refineries. This could change with a large-scale project in the region to compete with those found elsewhere in the world.
- Developments in the mid- and downstream sector tend to come bundled together. For example, a pipeline project will usually be accompanied with a refinery or gas plant. High levels of investment are needed as each project is dependent upon the other.
- Local representation is essential, preferably by a local person with knowledge of the local business environment.
- Investment in local employees and partners by providing training is highly desirable. This is the most sustainable and ethical option, and will also be the most economical option for international companies in the local run.
- Companies must consider the ways in which they can maintain integrity as there are high levels of corruption in certain sub-Saharan African nations.
- Security challenges are to be seriously reviewed; the oil and gas sector often creates new security challenges as a consequence of corruption and a lack of investment of the wealth generated from oil and gas back into the local economy.
- Any decision on involvement in a project in sub-Saharan Africa entails a long-term commitment. This long-term commitment has to be accompanied with flexibility in the long-term plans to cope with the unpredictability and instability of the region.
- Local content laws are leading IOCs to develop subsidiaries in the country of operation and construct their own operational and manufacturing facilities there. Local content is likely to develop to require companies in the oil and gas sector to be incorporated in the country of operation. International companies have an increasingly important role in providing expertise and skills to domestic companies.

3. Nigeria

3.1 Business environment

Nigeria is the most populous country and the largest producer of oil and gas in Africa. Oil and gas resources are located in the south of the country (see Table 3.1 and Figure 3.1). However, declining oil revenues are placing pressure on the government budget and proposed reforms. Increasing onshore security concerns and indigenous policies are pushing IOCs to limit their operations in Nigeria to offshore areas.

Nigeria has been a member of OPEC since 1971. The first shipment of oil from Nigeria was in 1958 and the first shipment of LNG was in 1999.

Table 3.1: Nigeria facts and figures

Capital	Abuja
Official language	English
Area	923,768 km ²
Population (2014 estimate)	174,507,539
Currency	Naira
GDP (PPP) total (2014)	USD 502 billion
GDP per capita (2014)	USD 2,836
GDP (official exchange rate) total (2013)	USD 292 billion
GDP (official exchange rate) per capita (2013)	USD 1,650
State Corruption Index (2013)	144 (out of 177)
Proven oil reserves (2013)	37.2 billion bbl
Proven natural gas reserves (2013)	182 tcf
Total oil production (2012)	2,524 Mbbl/d
Total natural gas production (2012)	1,190 bcf

Sources: United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/ni.html>>; US Energy Information Administration, Nigeria, August 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=ni>>; Transparency International, "Corruption Perception Index 2013," December 2013. <<http://www.transparency.org/country#NGA>>; OPEC, "OPEC Annual Statistical Bulletin 2013," July 2013. <http://www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB2013.pdf>.

Figure 3.1: Nigeria's major oil and gas activity and infrastructure



Base map from FreeVectorMaps.com
© London Research International 2013

3.1.1 Political stability and security

Nigeria is currently in its longest period of civilian rule since independence in 1960. A new constitution was adopted in 1999 after 16 years of military rule. The general elections of April 2007 marked the first civilian to civilian transfer of power. Nigeria is rated CC by the Economist political risk index.¹ National and state level elections are scheduled for February 2015 - President Goodluck Jonathan has not announced whether he will run again to be re-elected in the next election, although he has been trying to assert his authority through changes of leadership in the military and central bank. There is controversy whether the constitution allows him to run again or not, which has led to fractures within the incumbent party, the People's Democratic Party, and could be a source of political instability.²

The federal system helps to remedy the potential conflicts among Nigeria's 250 ethnic groups. However, the travel risk rating is high, due to various factors.³ Terrorism incidents are increasing. Nigeria has two main terrorist groups, Boko Haram and Movement for the Emancipation of the Niger Delta (MEND). The Nigerian Emergency Management Agency, set up as part of Goodluck's declaration of a state of emergency in May 2013, has reported that more than one thousand people have been killed in north-eastern Nigeria by Boko Haram in the first three months of 2014, and at least three million have been affected by the Islamist insurgency raging in the area.⁴ In April 2014, Boko Haram kidnapped over 200 female school children in Chibok. As of May 2014, the children have not been rescued.⁵ Security looks set to receive the highest allocation for the third consecutive year in the 2014 Nigerian budget.⁶

The oil industry is the source of the majority of corruption in Nigeria. As a result, violence and instability are prevalent in the Niger Delta region as the oil wealth of that region rarely makes its way back to the local people. MEND is a militant group concerned with the alleged exploitation and oppression of people living in the Niger Delta region. MEND's goal is to localize control of the oil and gas resources. In the short term, MEND poses a greater direct risk to oil and gas companies. Businesses have remained the primary target alongside utilities and infrastructure.⁷ The group's activity peaked in 2008 and 2009 and sharply declined in the following years due to the Yar'Adua amnesty declared by the Government. The Yar'Adua amnesty resulted in approximately 26,000 militants from various organisations enrolling in the programme.⁸ In return, the Government provided a monthly stipend worth three times the minimum wage, as well as training

1 The Economist Intelligence Unit, Nigeria, 11 March 2014. <<http://country.eiu.com/nigeria>>.

2 "Nigeria's Ruling Party Splinters," Stratfor Global Intelligence, 6 September 2013. <http://www.stratfor.com/node/200553/geopolitical_diary/20110816-eu-leaders-face-crossroads-european-integration>.

3 Harvard University, Harvard Travel Assist, Nigeria, 5 September 2013. <http://www.globalsupport.harvard.edu/travel_tools/ratings.shtml>.

4 Wallis, W., "Boko Haram insurgency affects 3m in northeast Nigeria, say relief agency," Financial Times, 27 March 2014. <<http://www.ft.com/cms/s/0/2d61aae0-b5b9-11e3-81cb-00144feabdc0.html?siteedition=uk#axzz2xGb2k000>>.

5 Dutta, K., "Nigerian schoolgirls kidnapping: We know where the girls are – but we can't get them back by force, says Army chief," The Independent, 26 May 2014. <<http://www.independent.co.uk/news/world/africa/boko-haram-kidnapping-nigerian-schoolgirls-located-says-defence-chief--but-they-cant-be-rescued-by-force-9436649.html>>.

6 Hassan, T.A., Sule, I.K., "Nigeria: Security Retains Top Spot in 2014 National Budget," AllAfrica, 20 December 2013. <<http://allafrica.com/stories/201312200587.html>>.

7 University of Maryland, Global Terrorism Database, December 2013. <http://www.start.umd.edu/gtd/search/Results.aspx?charttype=bar&chart=target&casualties_type=&casualties_max=&perpetrator=20301&count=100>.

8 Murphy, M., "Theft Petro Piracy: Oil and Troubled Waters," Orbis 57, 2013. <<http://www.sciencedirect.com/science/article/pii/S0030438713000343>>.

schemes. However, due to the scale of the terrorist problem, the fiscal sustainability of the program is questionable, and it is possible militants may simply return to their various organisations once the scheme has ended.

Piracy in West Africa is on the rise. Between 2003 and 2011 piracy in the Gulf of Guinea (including Nigerian waters) accounted for a third of all attacks in African waters.⁹ In 2013, an increase in kidnappings in the Gulf of Guinea and a corresponding decrease in Somalia led West Africa to overtake Somalia as the sub-region with the greatest number of pirate attacks.¹⁰ Overall, offshore production remains relatively stable; however, piracy does pose a risk.

Nigeria is ranked 144 out of 177 countries in the world according to the corruption perception index.¹¹ It has been estimated that up to a staggering USD 400 billion of Nigeria's oil and gas revenue has gone missing since independence in 1960.¹² The Nigeria Extractive Industries Transparency Initiative (NEITI) is mandated by law to promote accountability in the management of Nigeria's oil, gas and mining revenues. It is a national implementation of Extractive Industries Transparency Initiative (EITI). The EITI Global Conference in Sydney discussed the impact of NEITI in Nigeria, where it was mentioned that NEITI helped to recover USD 2 billion of taxes through promoting oil revenue transparency but its influence within the political sphere is seen to be limited.¹³ The extent to which Nigeria is serious about tackling corruption cannot be judged until clarity is provided in the Petroleum Industry Bill, although oil companies are concerned it will make business harder to conduct (see Section 3.3.1).

Pipeline vandalism and crude oil thefts are very serious problems.¹⁴ Shell claims that 98 per cent of oil spills are caused by vandalism, theft, sabotage or terrorism and that outdated pipelines account for only a small percentage of oil spills.¹⁵ A Shell spokesman stated that the company had 132 spills in 2012, less than the annual average of 175. One pipe section alone had 300 illegal taps and explosive devices were found on others.¹⁶ Deliberate attacks on oil pipelines and other infrastructure are common. Because of this, many operations are temporarily shut down and oil blocks have been sold.

3.1.2 Economy

Nigeria's economy is heavily dependent upon petroleum, constituting 95 per cent of the total export economy, which makes Nigeria the largest producer of oil in Africa. Nigeria has 37 billion bbl of proven oil reserves. Crude oil exports to the US have been declining

9 Chatham House, "Maritime Security in the Gulf of Guinea," March 2013. <http://www.chathamhouse.org/sites/default/files/public/Research/Africa/0312confreport_maritimalsecurity.pdf>.

10 ICC International Maritime Bureau, IMB Piracy Report highlights violence in West Africa, 15 July 2013. <<http://www.icc-ccs.org/news/865-imb-piracy-report-highlights-violence-in-west-africa>>.

11 Transparency International, "Corruption Perception Index 2013," December 2013. <<http://www.transparency.org/country#NGA>>.

12 "A desperate need for reform." The Economist, 20 October 2012. <<http://www.economist.com/news/middle-east-and-africa/21564906-goodluck-jonathan-says-he-wants-reform-oil-industry-really>>.

13 Balleny, L., "What impact has the EITI transparency initiative had on Nigeria?" Thomas Reuter Foundation, 26 May 2013. <<http://www.trust.org/item/20130526235456-nderv/>>.

14 Spring, A. and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.

15 Vidal, J., "Nigeria's agony dwarfs the Gulf oil spill. The US and Europe ignore it," The Guardian, 30 May 2010. <<http://www.theguardian.com/world/2010/may/30/oil-spills-nigeria-niger-delta-shell>>.

16 Ibid.

and China has emerged as their biggest export market for crude oil.¹⁷ Gas exports have been steadily increasing. Nigeria has not taken advantage of the income of the oil and gas sector to try to diversify their economy to other sectors. Attempts, however, have been made in the mid- and downstream sub-sectors of the oil and gas sector.

Nigeria has a large population of 175 million. In 2012, the total GDP at official exchange rates stood at USD 226.6 billion, therefore it was the third largest economy in Africa after South Africa and Egypt. Nigeria became the largest economy in Africa in April 2014 after they recalculated their GDP, although it should be considered that South Africa, now second, has a third of the population of Nigeria.¹⁸ The GDP real growth rate was high at 6.6 per cent in 2012, although the GDP per capita remained low at USD 1,500. The percentage of the population living below the poverty line was 70 per cent in 2010.¹⁹ The growth of the economy has not been translated into a significant improvement to the quality of life in Nigeria, as highlighted by the Niger Delta violence, with Nigeria ranked as 153 out of 186 in the Human Development Index 2013.²⁰

3.1.3 Infrastructure

Nigeria is ranked 129 out of 148 in the world for overall infrastructure by the World Economic Forum report 2013-2014.²¹ The urban population and the rate of urbanisation, which were 49.6 per cent and 3.75 per cent respectively in 2012, add serious pressure and demand on Nigeria's infrastructure.

One of the most serious problems is the power supply in Nigeria. Frequent power outages have led many businesses to use their own generators. Experts predict that the potential GDP growth, once a stable power supply is in place, could be over 10 per cent per annum.²² President Goodluck set in place a task force on power reform in 2010 to try to tackle the instability of electricity supply in Nigeria (see Section 3.2.3 for more details on the National Integrated Power Plant project, which preceded the reform). Part of the reform was the privatisation of the power sector, the effects of which will be felt during the next few years. In December 2012, Nigeria signed a pact with China's Sinohydro and China National Electrical Equipment to build a 700 MW hydro power station. Despite this, peak demand still stands at over three times the peak generation.²³

At present, the execution of projects by suppliers is hampered by the lack of infrastructure. After customs clearing, goods are often subject to further delays due to the poor condition of the port infrastructure and its overuse through constant traffic congestion. Nigerian ports lack rail infrastructure which further contributes to congestion and leads to ships queuing to berth at cargo terminals and containers waiting to be taken out of the ports. This has resulted in enormous bottlenecks which negatively affect the efficiency of

17 Spring, A. and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.

18 "Nigeria becomes Africa's biggest economy," BBC News, 6 April 2014. <<http://www.bbc.co.uk/news/business-26913497>>.

19 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/ni.html>>.

20 United Nations, "Human Development Report 2013," 14 March 2013. <<http://hdr.undp.org/sites/default/files/Country-Profiles/NGA.pdf>>.

21 World Economic Forum, "Global Competitiveness Report 2013-2014," 3 September 2013. <http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf>.

22 "The MINT Countries – the next economic giants?" BBC News, 6 January 2014. <<http://www.bbc.co.uk/news/magazine-25548060>>.

23 Federal Republic of Nigeria, The Presidential Task Force on Power, 13 March 2014. <<http://www.nigeriapowerreform.org/>>.

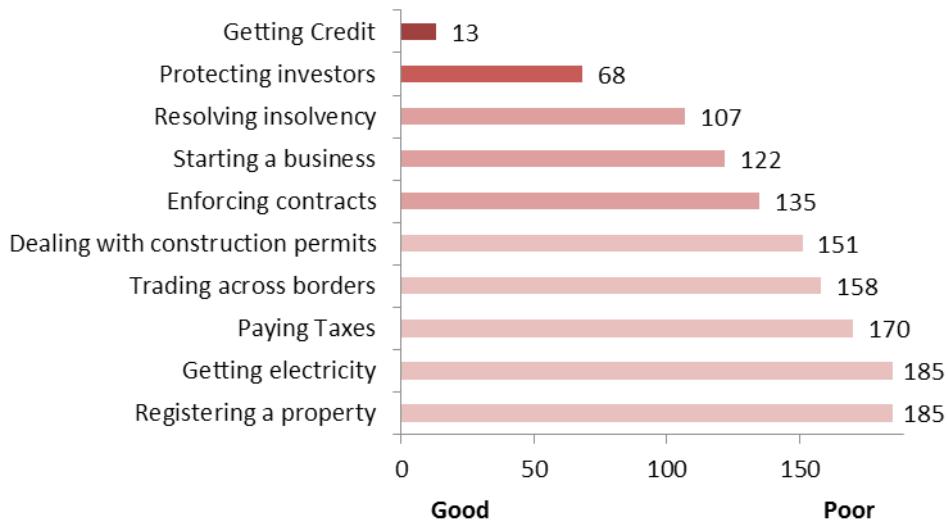
imports and exports.²⁴

Despite the poor state of the infrastructure at present, Nigeria is well placed to improve their infrastructure given the strength of their economy, oil revenues and the efforts being made to improve electricity supply throughout the country. New railways are being built in Abuja and between Lagos and Ibadan, whilst the Outer Northern expressway road is being rehabilitated. Notably, Nigeria already has an advanced ICT network for sub-Saharan Africa with 25 per cent of the population using the internet.

3.1.4 Operating in Nigeria

Overall, Nigeria is ranked 147 out of 189 countries in the world in relation to the ease of doing business. This puts Nigeria slightly above the regional average. Figure 3.2 shows the country's ranking for different aspects of doing business in Nigeria.

Figure 3.2: Ease of doing business rankings for Nigeria



Note: Countries are ranked from 1 to 189, with 1 as the best and 189 as the most difficult.

Source: Original data from Doing Business, "Doing Business 2014. Economy Profile: Nigeria," 29 October 2013 <<http://www.doingbusiness.org/reports/subnational-reports/~media/giawb/doing%20business/documents/profiles/country/NGA.pdf>>.

Three of the largest obstacles when running a business in Nigeria are paying taxes, registering property, and access to reliable electricity. The administration related to tax is burdensome. Registering property takes over two years and costs over 20 per cent of the property value.

Importing is fraught with obscurity, expenses and difficulties. Companies have reported that high fees, opaque valuation procedures, frequent policy changes and interpretations of the vague law by the Nigerian Customs Service (NCS) and other government agencies make importing difficult and expensive and can create serious obstacles for commercial

²⁴ United States, Office of the United States Trade Representative, Foreign Trade Barriers, Nigeria. 2012. <http://www.ustr.gov/sites/default/files/Nigeria_0.pdf>.

activities. The country also operates a destination inspection policy which can delay the cargo clearing process contributing to port congestion. It has been reported that issues with tariffs have resulted in many importers undervaluing and smuggling goods into the country to avoid paying the full fees.²⁵ This could promote the rise of domestic suppliers. Since 2008, export subsidies and promotion have ceased.

The National Petroleum Investment and Management Services (NAPIMS) agency must approve all procurement in the upstream oil and gas sector if it is worth over USD 500,000. The approval process is slow and can cause delays in operations.²⁶ There are also difficulties posed by the stringency of the local content requirements (see Section 3.3.2).

Resolving commercial disputes in the courts of Nigeria is an arduous process; companies have reported that contracts are often breached and the courts do not provide any substantial support.²⁷

The Nigerian Government is aiming to secure more direct ownership of its oil and gas reserves through its nationally-owned oil company or local firms. This has led to several major IOCs disposing of assets in the country. Chevron is selling minority stakes it holds in joint ventures that operate in five oil blocks that are majority-owned by the Nigerian National Petroleum Company (NNPC). Investors interested in three shallow water oil blocks for sale by Chevron may lose the right to operate them.²⁸ The state oil firm has the right to take over the operatorship as majority shareholder. "Automatic operatorship" does not come with the acquisition of blocks and this is highly problematic for many investors and IOCs.²⁹

3.2 Resources and infrastructure

3.2.1 Oil

Reserves

Nigeria has proven reserves of oil totalling 37.2 billion bbl as of 2013, making it the largest reserve holder in sub-Saharan Africa and 11th largest in the world. Proven reserves more than doubled in the last 30 years, from just above 16 billion barrels in 1983. Figure 3.3 shows the development of Nigeria's proven oil reserves. The Nigerian Government hopes to increase proven reserves to 40 billion barrels in the coming years, although this is likely to be hampered by the ongoing security issues in many of the oil producing states (see Section 1.1.1). Exploration activity is at its lowest in 10 years with just three wells drilled in 2011 compared to over 20 in 2005.³⁰ Between 2009 and 2011, there were only 4 deepwater discoveries in Nigeria, compared to three times as many in Angola for the same period.³¹

25 Ibid.

26 Ibid.

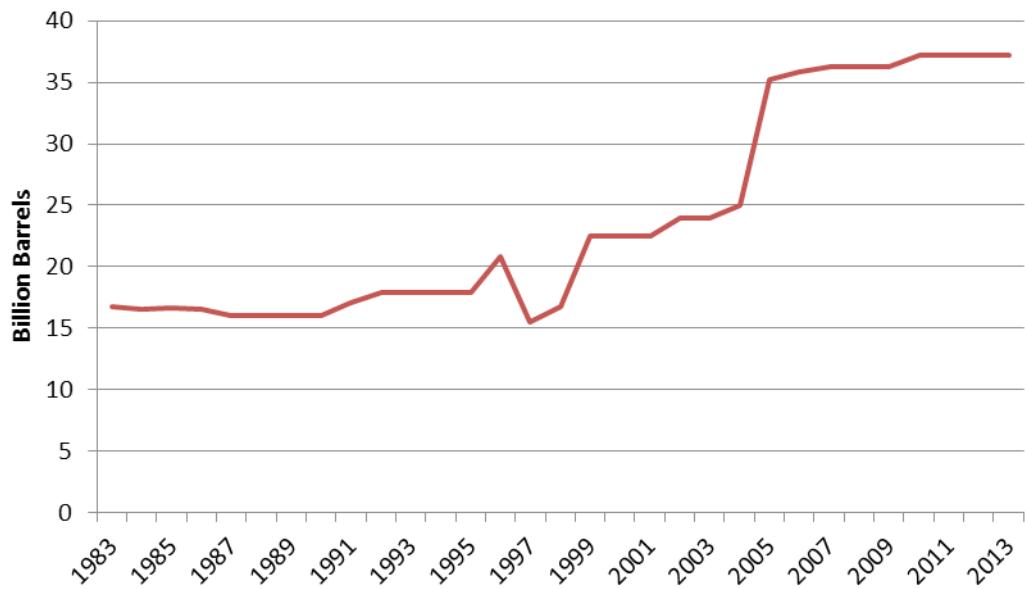
27 Ibid.

28 "Chevron warns oil block buyers could lose operating rights," Reuters, 5 September 2013. <<http://www.reuters.com/article/2013/09/05/nigeria-chevron-idUSL6N0H11KU20130905>>.

29 Ibid.

30 US Energy Information Administration, "Nigeria Country Analysis," 30 December 2013. <<http://www.eia.gov/countries/analysisbriefs/Nigeria/nigeria.pdf>>.

31 Nigeria Oil & Gas Intelligence, "A Way forward for the Nigerian Oil/Gas and Power Sectors," 11 March 2013. <<http://www.nigeriaoilandgasintelligence.com/a-way-forward-for-the-nigerian-oilgas-and-power-sectors/>>.

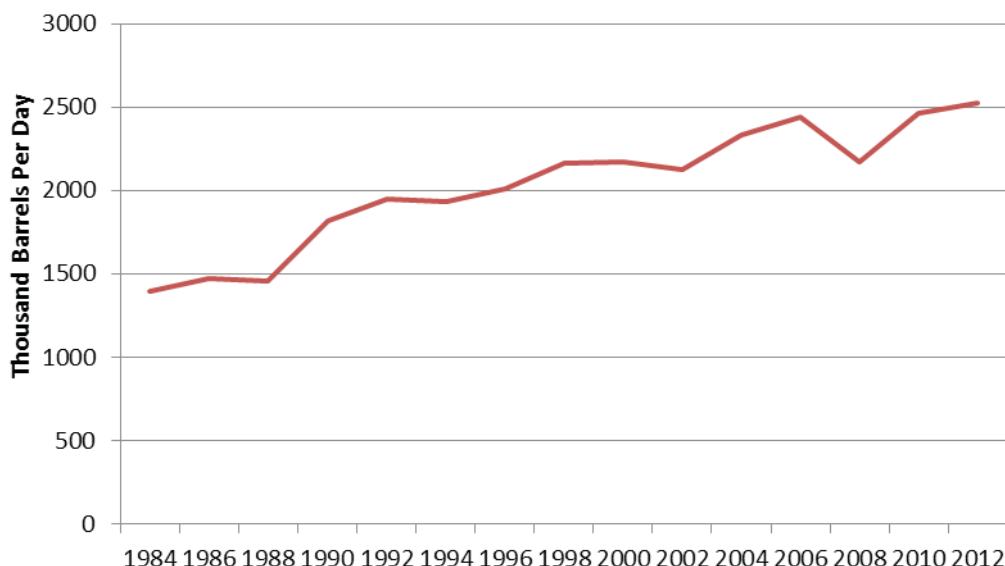
Figure 3.3: Nigeria proven crude oil reserves (1983-2013)

Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

Exploration has been impacted by several factors. The emergence of new oil and gas basins associated with lower political risk in other countries are increasingly attracting investment. Hydrocarbon discoveries in Ghana, Liberia, and Sierra Leone, and in East Africa in Uganda, Mozambique, Tanzania and Kenya, have attracted considerable attention and investment from IOCs. At the same time, a lack of transparency within bidding rounds, corruption, and uncertainty surrounding fiscal terms and conditions have reduced overall investment in the Nigerian oil and gas sector. The Federal Government may need to incentivise exploration to see a rise in proven oil reserves in the near future.

Production

Nigeria produced more than 2,500 Mbbl/d in 2012, up from 1,393 Mbbl/d in 1984 (see Figure 3.4). Although this represents a significant increase over the past 30 years, it is almost half of the on-going target of 4,000 Mbbl/d. When production dipped temporarily in 2008/09, Angola briefly overtook Nigeria as the region's largest producer of oil.

Figure 3.4: Nigeria total oil production (1984-2012)

Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

In the 1990s, the Government endeavoured to attract investment in deepwater acreage to increase production capacity and move away from reliance on the unstable Niger Delta region. The Government implemented a policy whereby IOCs could receive a greater percentage of revenue for deeper oil production wells.³² The generous fiscal terms led IOCs to increase the level of deepwater production under PSCs whilst onshore and shallow offshore production under JVs, which have more favourable fiscal terms for the Federal Government, have seen a decrease.³³ This measure has put some stress on government revenue.

The first deepwater field production began in 2003 and deepwater fields now contribute over 800 Mbbl/d, which is about one third of the overall production capacity. Proven oil reserves and production are primarily located in the Niger Delta Basin, an area of roughly 240,000 km². The most recent deepwater field to come on-stream was Total's Usan field in mid-2012. The facility was expected to plateau at approximately 180 Mbbl/d by the end of 2013.³⁴

Nigeria has an oil production quota of 1.704 MMbbl/d set by OPEC. The country has several planned projects that it hopes to bring on-stream in the next few years. Many of these projects have been delayed by the uncertainty surrounding the PIB (Petroleum Industry Bill) and the fiscal and regulatory terms it will impose on the sector (see Section 3.3.1).³⁵

32 US Energy Information Administration, "Nigeria Country Analysis," 30 December 2013. <<http://www.eia.gov/countries/analysisbriefs/Nigeria/nigeria.pdf>>.

33 Akinoshio, T., "Nigeria: Deepwater PCS Incentive Turns On Its Head," Africa Oil and Gas Report, 20 December 2013. <<http://africaoilgasreport.com/2013/12/in-the-news/nigeria-deepwater-psc-incentive-turns-on-its-head/>>.

34 Total, Production Sites in Nigeria. <http://www.ng.total.com/04_total_nigeria_activities/0405_production_sites.htm>.

35 US Energy Information Administration, "Nigeria Country Analysis," 30 December 2013. <<http://www.eia.gov/countries/analysisbriefs/Nigeria/nigeria.pdf>>.

Exports

The Nigerian economy was not diversified by the past military rulers and is largely dependent on the hydrocarbon sector for government revenue. Hydrocarbon exports accounted for 75 per cent of government revenue in 2011.³⁶ In 2011, the country exported 2.2-2.3 MMbbl/d of crude oil, roughly the same as the previous year (see Figure 3.5). Nigeria produces high quality crude oil, which is the preferred fuel for industry and manufacturing.³⁷

Figure 3.5: Nigerian exports of crude oil (1986-2010)



Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

Oil exports make up over 90 per cent of total exports and as such Nigeria's economy is highly vulnerable to oil price volatility. The IMF report of December 2013 suggests that a sustained decrease in oil prices would significantly weaken the economy.³⁸ The overall value of petroleum exports is currently estimated to be USD 94.64 billion.³⁹ Nigeria has several FPSO vessels, which help to facilitate exports from deepwater offshore fields. There are several terminals and ports with facilities to export petroleum products, including Abo Terminal, Bonny Terminal, Apapa Lagos and Port Harcourt.

In 2012, Nigeria exported 18 per cent of its crude oil to the US. This amounted to 406 Mbbl/d, a significantly greater amount than the export to India, which was the next largest export destination at 12 per cent (see Figure 3.6). Besides being a major export location, India has attempted to become involved with Nigerian oil and gas projects. India's involvement in the Nigerian oil industry has not reaped the expected rewards. As

36 IMF, "Nigeria 2012 Article IV Consultation," May 2013. <<http://www.imf.org/external/pubs/ft/scr/2013/cr13116.pdf>>.

37 US Energy Information Administration, "Nigeria, the largest crude oil producer in Africa, is a major source of U.S. imports," 13 September 2011. <<http://www.eia.gov/todayinenergy/detail.cfm?id=3050>>.

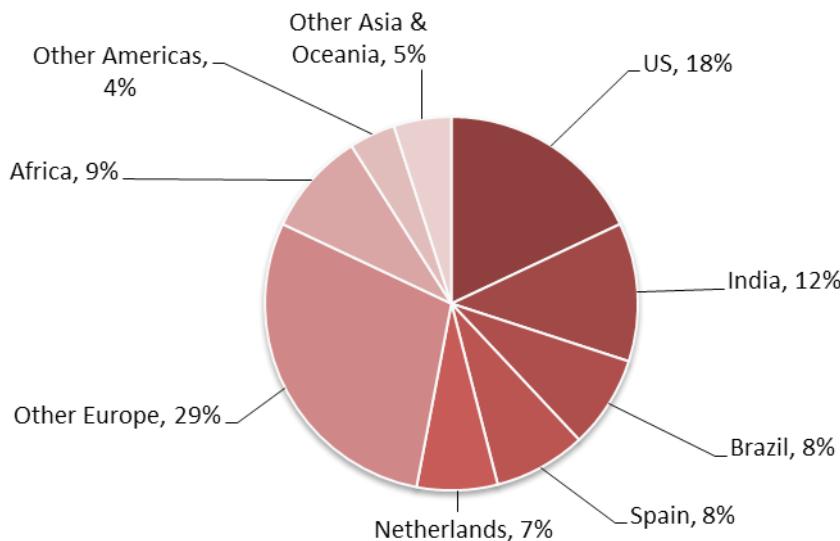
38 IMF, Statement at the Conclusion of the IMF Article IV Consultation Mission to Nigeria, 4 December 2013. <<http://www.imf.org/external/np/sec/pr/2013/pr13488.htm>>.

39 OPEC, Nigeria facts and figures, 2013. <http://www.opec.org/opec_web/en/about_us/167.htm>.

with other new market entrants to the Nigerian oil and gas sector, Indian business deals have faltered because the deals became caught up in complex Nigerian politics.⁴⁰

Nigeria is the fourth largest foreign supplier of oil to the US. However, exports of Nigerian crude oil to the US have decreased over the past two years. This is due to the fact that US companies favoured domestically produced crude oil and that two significant refineries on the east coast of the US were not available for part of 2011.⁴¹ Despite the changes in the US, the Nigerian oil trade has been relatively stable over the last decade.

Figure 3.6: Nigerian oil exports by destination (2012)



Source: US Energy Information Administration, "Nigeria Country Analysis," 30 December 2013. <<http://www.eia.gov/countries/analysisbriefs/Nigeria/nigeria.pdf>>.

Other significant importers of Nigerian crude oil are European countries, including the Netherlands, Spain, France, Italy, U.K., Germany, Portugal, Ireland, Gibraltar and Norway, who combined import 44 per cent of Nigerian oil. Given the increasing oil needs of Brazil, Russia, India and China (the BRIC countries), it seems likely that exports to Brazil, India, China and possibly Russia will increase over the coming years.

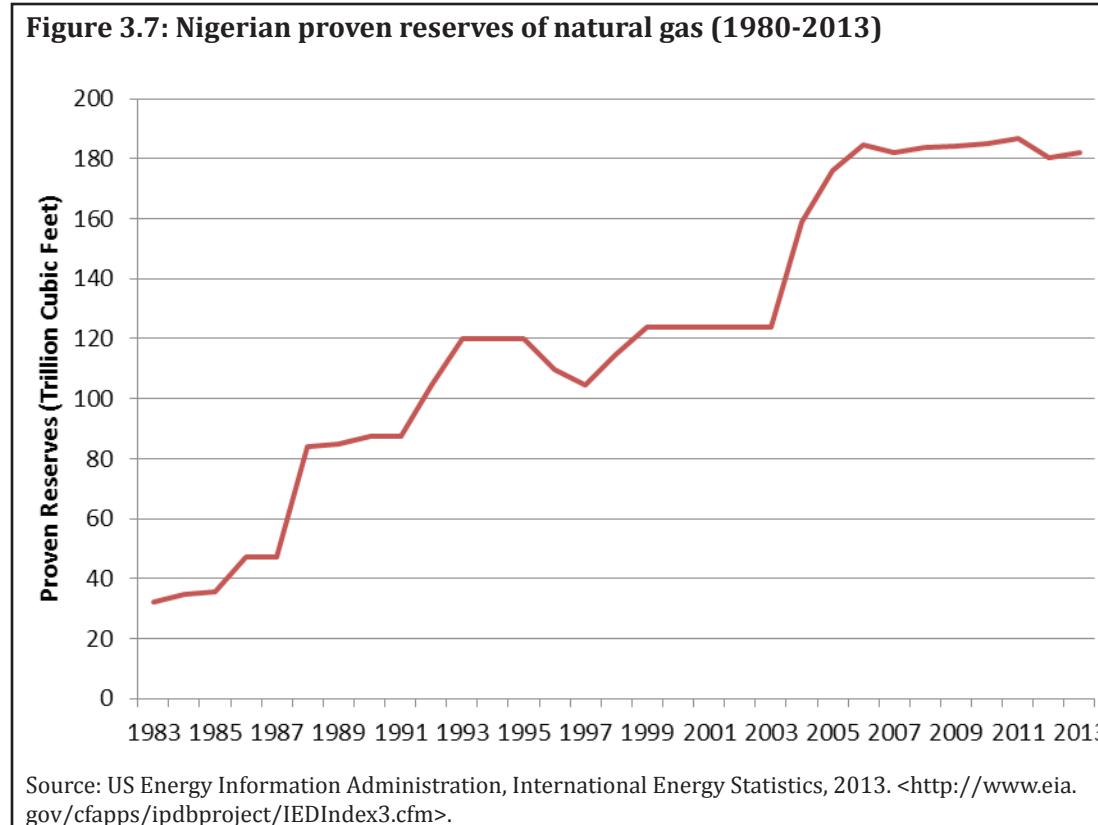
3.2.2 Gas

Reserves

Nigeria has seen a fivefold increase in proven natural gas reserves over the past 30 years. In 1983, reserves were estimated to be 32.4 tcf. In 2013, this figure had increased to 182 tcf. Nigeria has the largest proven gas reserves on the continent and the ninth largest globally. As with oil, most of the gas reserves are located in the Niger Delta region and thus the industry faces many of the same operational challenges.

40 Vasudevan, P., "The Changing Nature of Nigeria-India Relations," Chatham House, December 2010. <<https://www.chathamhouse.org/sites/default/files/public/Research/Africa/1210vasudevan.pdf>>.

41 US Energy Information Administration, "Nigeria Country Analysis," 30 December 2013. <<http://www.eia.gov/countries/analysisbriefs/Nigeria/nigeria.pdf>>.



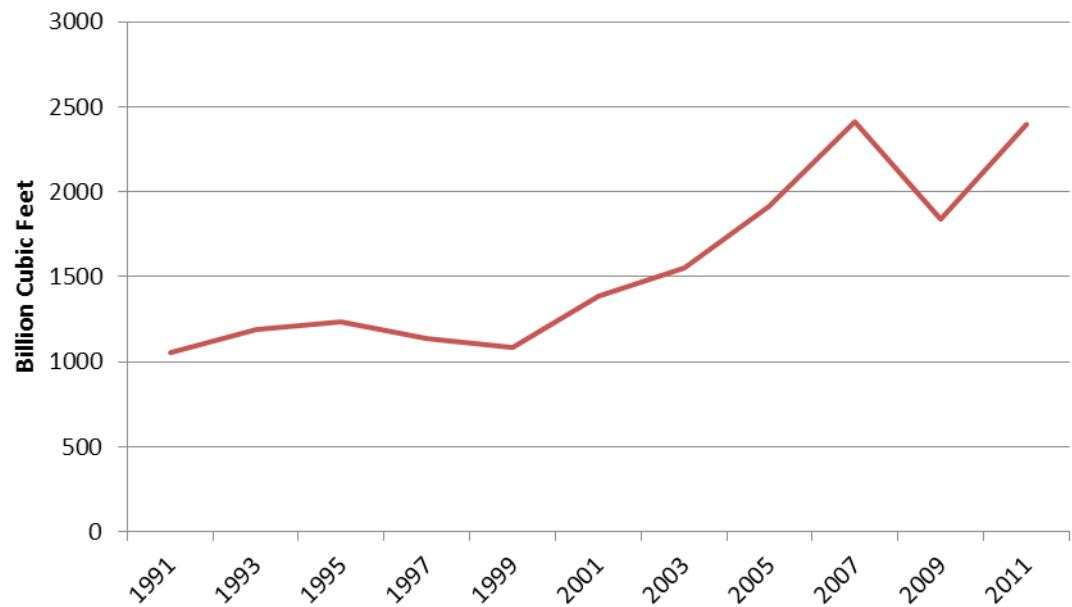
Production

Despite the considerable size of the reserves, Nigeria is ranked as the world's 25th largest producer. In 2011, gross natural gas production was 2,399 bcf. Of this, 619 bcf (26 per cent) was vented or flared, 348 bcf (15 per cent) re-injected and 1,432 bcf (59 per cent) was marketed natural gas.⁴² Historically, fields only containing gas were not developed as oil was prioritised. However, that looks set to change with Nigeria's increase in mid- and downstream gas infrastructure needing gas supplies.

Natural gas is exported as LNG via the West Africa Gas Pipeline (WAGP). Shell Nigeria Gas Limited (SNG) also delivers compressed natural gas (CNG) to industries. The country flared nearly 30 per cent of the gross natural gas produced in 2011. The Nigerian National Petroleum Company (NNPC) stated that flaring cost Nigeria USD 2.5 billion a year in lost revenue. The Government has been trying to end flaring for several years now. Although the progress has been slow. Conditions in Niger Delta have made it challenging to construct the necessary infrastructure that would allow natural gas to be produced and marketed rather than flared. Nigeria is listed as the second largest gas flaring country in the world after Russia.⁴³

42 US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

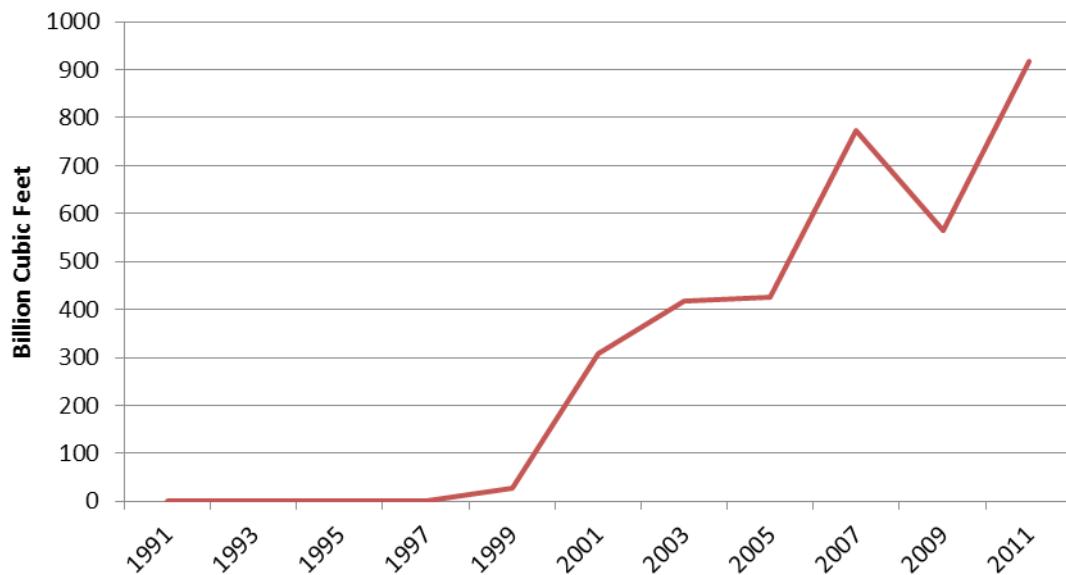
43 US Energy Information Administration, "Nigeria Country Analysis," 30 December 2013. <<http://www.eia.gov/countries/analysisbriefs/Nigeria/nigeria.pdf>>.

Figure 3.8: Nigeria gross natural gas production (1991-2011)

Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

Gas exports

Nigeria exported 916 bcf of natural gas in 2011, up from 26 bcf in 1999 (see Figure 3.9). Exports increased over 35 times from those 12 years earlier. Production and export of natural gas is likely to increase in the coming years as natural gas exploration and the capacity to capture associated gas will boost production. Nigeria's priority is upon the utilisation of gas for domestic consumption - increasingly, the Government is adding the requirement to develop gas infrastructure as a condition on the award for licenses for oil and gas upstream activities. A vital component of the strategy to stabilise the electricity supply in Nigeria is through the construction of gas-fired power plants, which could lead to gas exports levelling or decreasing. If and when the power supply stabilises and if there is sufficient production, then gas exports are likely to start incrementally rising. The amount of exports will also be strongly influenced by Nigeria's increased ability to process and transport gas through proposed midstream infrastructure gas projects.

Figure 3.9: Nigeria exports of dry natural gas (1991-2011)

Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

3.2.3 Oil and gas infrastructure

Pipeline infrastructure

The Government through NNPC owns and operates 5,120 km of pipelines within the Nigerian border, including 4,315 km of multi-product pipelines and 666 km of crude oil pipeline. Nigerian Gas Company (NGC), a subsidiary of NNPC, have 1,250 km of gas pipelines with an overall design capacity of more than 2.5 bcf/d of gas, 16 compressor stations and 18 metering stations. The Escravos to Lagos Pipeline System (ELPS) is the main pipeline for domestic consumption of gas.⁴⁴ The Government hopes to expand the pipeline system further in the coming years to better cater to domestic consumption and to enhance the export capacity.

NGC currently operates the following gas pipeline supply systems:⁴⁵

- The Aladja Gas Pipeline System supplies the Delta Steel Company, Aladja
- The Sapele Gas Supply Systems supplies PHCN Power Station, Ogorode, Sapele
- The Imo River – Aba System supplies the International Glass Industry Limited PZ, Aba Textile Mills and Aba Equitable Industry
- The Obigbo North – Afam system supplies PHCN Power Station, Afam

44 "NNPC: a pipeline of opportunities," Pipelines International, June 2010. <http://pipelinesinternational.com/news/nnpc_a_pipeline_of_opportunities/041509/>.

45 Nigerian National Petroleum Corporation, Nigerian Gas Company Limited. <<http://www.nnpcgroup.com/NNPCBusiness/Subsidiaries/NGC.aspx>>.

- The Alakiri – Onne Gas pipeline system supplies the Notore Complex for fertilizer production
- The Alakiri – Obigbo North – Ikot Abasi system supplies the Ikot Abasi aluminium plant
- The Escravos-Lagos Pipeline (ELP) supplies NEPA's Egbin Power Plant. Subsequent spur lines from the ELP supply the West African Portland, Cement Plants at Shagamu and Ewekoro, Ikorodu PZ Industries, Ikeja City Gate, PHCN Delta IV at Ughelli, and Warri Refining and Petrochemical Company
- Ibafo – Ikeja Gas Supply Pipeline System supplies Ikeja City Gate from where Gaslink distributes to the Lagos Industrial Area
- Ikeja – Ilupeju – Apapa Gas Pipeline System supplies the Greater Lagos Industrial Area
- Ajaokuta – Geregu Gas Pipeline System supplies the Geregu PHCN Power Plant
- Ajaokuta – Obajana Gas Pipeline System supplies Dangote's Obajana Cement Plant

The extensive pipeline system, often in remote areas, is hard to police and is vulnerable to sabotage and theft. The Chairman of the NEITI claimed that Nigeria lost out on as much as USD 10.9 billion in potential oil revenues due to oil theft between 2009 and 2011.⁴⁶ Estimates on the scale of this problem vary, though one recent report suggests that theft is costing the Nigerian State and oil companies around USD 1.6 billion per month, more than the public spending on education and health.⁴⁷ Security experts have suggested that the scale of the theft (estimated to be up to 250 Mbbl/d) could not have been achieved without the involvement of officials.⁴⁸ Oil theft is generally carried out by both opportunistic local residents and on a larger scale by well-equipped professional criminals.⁴⁹ It results in an enormous loss of revenue for both the state and IOCs operating in Nigeria.

The NNPC has a major interest in the WAGP which carries Nigerian gas to Benin, Togo and Ghana. The pipeline is 678 km long and has a supply capacity of 170 MMcf/d of natural gas.⁵⁰ WAGPCO (West African Gas Pipeline Company Ltd) is owned by Chevron West African Gas Pipeline Ltd (36.9 per cent), NNPC (24.9 per cent), Shell Overseas Holdings Limited (17.9 per cent) and Takordi Power Company Limited (16.3 per cent), Societe Togolaise de Gaz (2 per cent) and Societe BenGaz S.A. (2 per cent).⁵¹

Oil refinery capacity

Nigeria has three refineries (Port Harcourt I & II, Warri and Kaduna), all owned by the

46 "Nigeria loses \$10.9bn to oil theft," Fin24, 30 July 2013. <<http://www.fin24.com/Economy/Nigeria-loses-109bn-to-oil-theft-20130730>>.

47 Vidal, J., "£1bn a month: the spiralling cost of oil theft in Nigeria," The Guardian, 6 October 2013. <<http://www.theguardian.com/global-development/2013/oct/06/oil-theft-costs-nigeria>>.

48 Nigeria loses \$10.9bn to oil theft," Fin24, 30 July 2013. <<http://www.fin24.com/Economy/Nigeria-loses-109bn-to-oil-theft-20130730>>.

49 Murphy, M., "Theft Petro Piracy: Oil and Troubled Waters," Orbis 57, 2013. <<http://www.sciencedirect.com/science/article/pii/S0030438713000343>>.

50 Chevron, Nigeria, April 2013. <<http://www.chevron.com/countries/nigeria/businessportfolio/>>.

51 "NNPC: a pipeline of opportunities," Pipelines International, June 2010. <http://pipelinesinternational.com/news/nnpc_a_pipeline_of_opportunities/041509/>.

NNPC with a nominal crude oil distillation capacity of 445 Mbbl/d in 2012. Port Harcourt plants were built in 1965 and 1989. The two refineries were merged in 1993. Further, the Eleme Petrochemical plant was built next to Port Harcourt in the mid-1990s. The plant has an olefin capacity of 80,000 Mtpa and a polyethylene capacity of 250,000 Mtpa. Warri refinery was built in the late 1970s and had a carbon black plant and a polypropylene plant added in the late 1980s. Kaduna refinery was built in 1980 with various extensions added in the late 1980s.⁵²

A domestic company, Orient, commissioned construction of an oil refinery in Anambra in August 2012. The facility was attacked in March 2014, when much of the heavy equipment was destroyed.⁵³ The initial processing capacity is planned to be 20 Mbbl/d.

Refinery operations in Nigeria have faced operational challenges and production rates generally fall well below capacity. The refineries are poorly maintained and theft and damage to both refineries and pipelines contribute to operational challenges. None of the refineries in Nigeria have ever been fully operational or reached full production capacity. In 2009, low refinery production forced the country to import almost 85 per cent of its relatively low fuel needs. In 2012, the country consumed only 270 Mbbl/d.⁵⁴ The Government hopes to improve refinery capacity by conducting extensive maintenance, but this has been delayed due to a lack of financing. The Petroleum Minister claimed Nigeria would try to sell all three refineries to private companies by early 2014, although President Goodluck has contradicted this statement.⁵⁵ The Nigerian Government (through the NNPC) has agreed to trade crude oil for refined products with Trafigura and the Société Ivoirienne de Raffinage (SIR) in the Ivory Coast until refinery capacity improves in Nigeria.⁵⁶

Gas processing facilities

Nigeria's only LNG processing facility, located on Bonny Island near Port Harcourt began operation in 1999. NNPC has 49 per cent stake, Shell has 25.6 per cent, Elf has 15 per cent and Agip has 10.4 per cent. Presently, six LNG trains are in operation with a seventh train scheduled for 2015.⁵⁷ The Bonny Island LNG plant has a capacity of 22 MMtpa of LNG and 4 MMtpa of LPG.

The main features of the operational plant are:

- Dedicated gas transmission pipelines passing through over 110 communities
- Three LNG storage tanks with a capacity of 84,200 m³ each

52 Nigerian National Petroleum Company, Refineries and Petrochemicals, May 2014. <<http://www.nnpcgroup.com/nnpccbusiness/midstreamventures/refineriespetrochemicals.aspx>>.

53 "Kogi warriors destroy Orient Oil & Gas refinery (Anambra)," New Express, 5 March 2014. <<http://www.newsexpressngr.com/news/detail.php?news=4851>>.

54 US Energy Information Administration, "Nigeria Country Analysis," 30 December 2013. <<http://www.eia.gov/countries/analysisbriefs/Nigeria/nigeria.pdf>>.

55 Bala-Gbogbo, E., "Nigeria Plan Sale of Four State-Owned Oil Refineries Next Year," Bloomberg, 18 November 2013. <<http://www.bloomberg.com/news/2013-11-18/nigeria-plan-sale-of-four-state-owned-oil-refineries-next-year.html>>; African Mining Brief, Nigeria's president denies plan to privatise oil refineries. <<http://ambriefonline.com/mining-updates/current-news/2234-nigeria-s-president-denies-plan-to-privatise-oil-refineries>>.

56 Obasi, S., "Nigeria'll sell oil refinery next year - Diezani," Vanguard Nigeria, 18 December 2013. <<http://www.vanguardngr.com/2013/12/nigeriall-sell-oil-refineries-next-year-diezani-2/>>.

57 "Nigeria LNG targets 2015 for Train 7 project's take off," The Guardian, 20 January 2014. <<http://www.theguardianmobile.com/readNewsItem1.php?nid=21739>>.

- A common fractionation plant to process LPG (1 MMtpa)
- Two condensate storage tanks with a capacity of 36,000 m³ each
- Two 65,000 m³ LPG refrigerated tanks (for propane and butane)
- Eight generators with a total capacity of 320 MW
- Two LNG export jetties
- One LPG and condensate export jetty
- 20 LNG tankers dedicated to Nigeria LNG service
- 20 materials off-loading jetties
- A residential area covering 2.08 km²

Pan Ocean operates the Ovade-Ogharefe gas processing plant.⁵⁸ The plant has a production design capacity of 130 MMcf/d. It provides 65 MMcf/d of allocated gas supply to the Egbin power station. The plant will further supply LPG to the Nigerian domestic market when fully completed. Pan Ocean signed the Gas Sales Aggregation Agreement with the Federal Government and Egbin power station in June 2010. Skye Bank financed a development of the gas processing plant to reduce flaring in January 2014.⁵⁹

The Warri natural gas processing facility finished construction in 2011. Volumes up to 130 MMcf/d can be processed. The Okoloma gas processing plant provides gas for the Afam VI power plant. The plant can process 240 MMcf/d.⁶⁰ The much delayed Escravos Gas to Liquid plants is due to be operational in 2014.⁶¹

Gas power stations

Table 3.2 gives a list of gas-fired power stations found in Nigeria. The National Integrated Power Project was conceived in 2005, which led to the development and commissioning of 10 gas-fired power plants in Nigeria, resulting in 5,450 MW additional capacity.⁶² It should be noted that many of these are not fully operational and as of 2014 the NIPP power plants are being sold and privatised in Nigeria.⁶³ For example, Transcorp now own the Ughelli plant and plan to increase the capacity to over 1,000 MW in the next three to five years with the output increasing to 700 MW by December 2014.⁶⁴

58 Careers in Africa, Pan Ocean Oil Corporation. <<http://www.careersinafrica.com/company/pan-ocean/>>.

59 Alike, Ejiofor. "Nigeria: Skye Bank Finances Pan Ocean's Gas Plant." AllAfrica. 8 Jan 2013. <<http://allafrica.com/stories/201301080244.html>>.

60 Shell, The Afam VI Power Plant & Okoloma Facility, April 2011. <<http://s00.static-shell.com/content/dam/shell-new/local/country/nga/downloads/pdf/2013bnotes/afam.pdf>>.

61 Atuanya, P., "Chevron, Sasol, set to commission \$10 bn Escravos GTL plant in Nigeria," Business Day Online. March 2014. <<http://businessdayonline.com/2014/03/chevron-sasol-set-to-commission-10-bn-escravos-gtl-plant-in-nigeria/#.Uz1jYahdWig>>.

62 National Integrated Power Project. <<http://www.nipptransactions.com>>.

63 Ogunlesi, T., "Nigeria's dysfunctional state power plants set to go private," Financial Times. 7 May 2013. <<http://www.ft.com/cms/s/0/1b93eb52-b326-11e2-95b3-00144feabdc0.html#axzz2xjET7t63>>.

64 Okpamen, E., "Nigeria: Transcop To Increase Ughelli Power Plant Capacity," Ventures, 1 February 2014. <<http://www.ventures-africa.com/2014/02/nigeria-transcorp-to-increase-ughelli-power-plant-capacity/>>.

Table 3.2: Gas-fired power stations in Nigeria

Name	Type	Capacity (MW)	Year completed	Status
AES Barge	Simple cycle gas turbine	270	2001	Operational
Aba	Simple cycle gas turbine	140	2013	Operational
Afam IV-V	Simple cycle gas turbine	726	1982/2002	Partially operational
Afam VI	Combined cycle gas turbine	624	2009, 2010	Operational
Alaoji	Combined cycle gas turbine	1074	2015	Partially operational 225MW
Calabar	Simple cycle gas turbine	561	2014	Under construction, awaiting gas supply
Egbema	Simple cycle gas turbine	338	N/A	Under construction
Egbin	Gas-fired steam turbine	1320	1985-1986	Partially operational 994 MW
Geregu I and II	Simple cycle gas turbine	848	2007, 2013	Operational
Ibom	Simple cycle gas turbine	190	2009	Partially operational 60 MW
Ihovbor	Simple cycle gas turbine	450	2014	Commissioning
Okpai	Combined cycle gas turbine	480	2005	Operational
Olorunsogo	Simple cycle gas turbine	336	2007	Partially operational 160 MW
Olorunsogo II	Combined cycle gas turbine	675	2012	Partially operational 562 MW
Omoku I and II	Simple cycle gas turbine	375	2005, 2013	Operational
Omotosho I and II	Simple cycle gas turbine	450	2012	Partially operational 375 MW

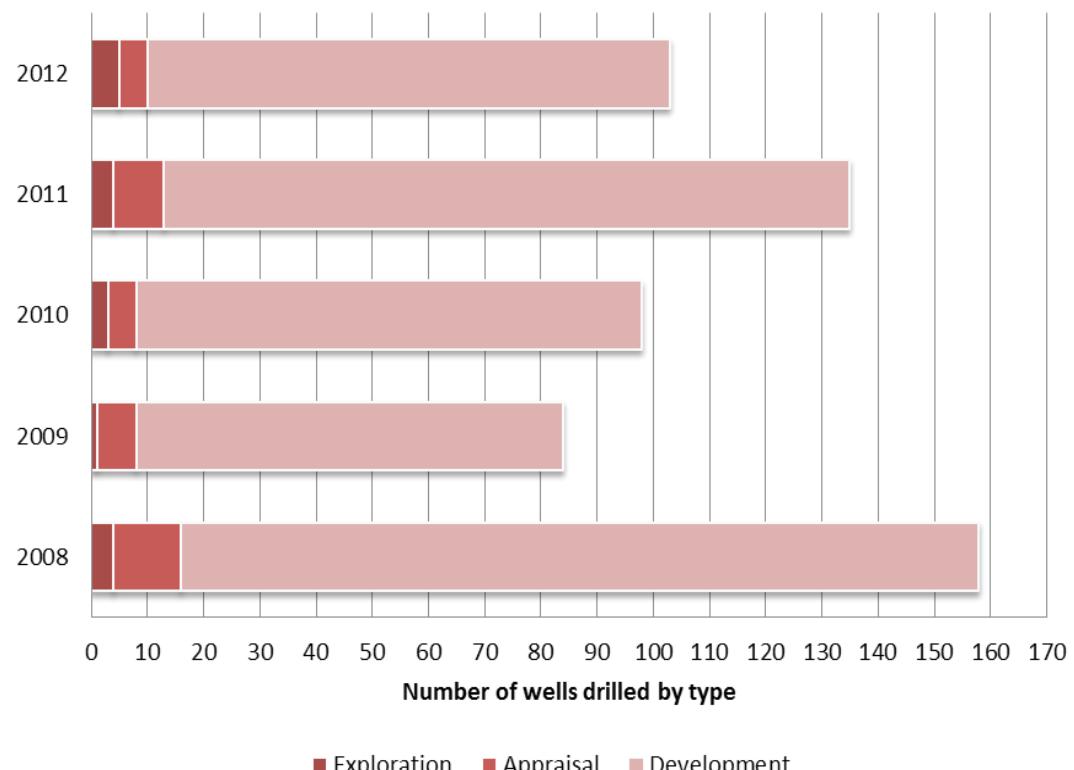
Sapele I	Gas-fired steam turbine and Simple cycle gas turbine	1020	1978, 1981	Partially operational 200 MW
Sapele II	Simple cycle gas turbine	450	2012	Operational
Ughelli	Simple cycle gas turbine	900	1996, 1975, 1978, 1990	Partially operational 360 MW

Source: Wikipedia, List of power stations in Nigeria. <http://en.wikipedia.org/wiki/List_of_power_stations_in_Nigeria>.

3.2.4 Planned oil and gas projects

Table 3.3 gives details of selected planned projects and developments across all sectors of the oil and gas industry in Nigeria. In addition to the projects outlined in the table, details of three important midstream projects are given below the table. Figure 3.10 shows the drilling activity in Nigeria from 2008 to 2012, which indicates that the majority of wells drilled recently have been development wells.

Figure 3.10: Drilling activity in Nigeria (2008-2012)



Source: Department of Petroleum Resources, Upstream Statistics. <<http://dprnigeria.org.ng/dpr-operations/upstream-regulation/statistics/>>.

Nigeria's most recent bidding round was the second round of Marginal Fields, which are encouraging indigenous oil companies' participation. To be eligible to bid, the company must be a registered Nigerian company, 51 per cent owned by Nigerian citizens, no single shareholder may own more than 25 per cent of the shares and the company must have upstream oil and gas experience. Thirty-one fields with unproduced discoveries were up for bidding. Applications were submitted in December 2013.⁶⁵

Table 3.3: Planned oil and gas projects in Nigeria

Project	Capacity (Mbbl/d)	(Estimated) Start-up	Sector	Operator
Agbami (phase 2)	100	2012-2016	Deepwater ¹	Chevron
Ofon (phase 2)	90	2014	Offshore	Total
Olero Creek Restoration Project	48	2013-2014	Onshore	Chevron
Bongo Northwest	40	2014	Deepwater	Shell
Escravos Gas to Liquids Plant	33 (325 MM cf/d gas)	2014	Midstream	Chevron
Qua Iboe Power Plant	534 MW	2014+	Downstream	ExxonMobil
Etim/Asasa Pressure Maintenance	50	2013-2015	Deepwater	ExxonMobil
Forcados Yokri Integrated Project 2	90	2015-2016	Offshore	Shell
Southern Swamp Associated Gas 2	85	2015-2017	Offshore	Shell
Gbaran Ubie 2	70	2016	Midstream	Shell
Dibi Long-Term Project	70	2016	Onshore	Chevron
Sonam Field Development	30 (215 MMcf/d gas)	2016	Offshore	Chevron
Agura Independent Power Project (Phase 1)	330 MW	2016	Downstream	Chevron
Bosi	140 (260 MMcf/d gas)	2016+	Deepwater	ExxonMobil
Ehra North (Phase 2)	60	2016+	Deepwater	ExxonMobil
Satellite Field Development Phase 2	80	2016+	Offshore	ExxonMobil
Uge	110 (20 MMcf/d gas)	2016+	Deepwater	ExxonMobil

65 Mercier, T. and Olawuyi, D., "Nigeria: oil and gas licensing round for marginal fields 2013," Norton Rose Fulbright, December 2013. <<http://www.nortonrosefulbright.com/knowledge/publications/110619/nigeria-oil-and-gas-licensing-round-for-marginal-fields-2013>>.

Bongo North	100 (60 MMcf/d gas)	2016+	Deepwater	Shell
Bonga Southwest	225 (15 MMcf/d gas)	2016+	Deepwater	Shell
Usan Future Phases	50	2016+	Deepwater	Total
Nsiko	NA	2017+	Deepwater	Chevron
Egina	200	2017+	Deepwater	Total

Note: Deepwater projects have a water depth of greater than 200m.

Source: US Energy Information Administration, "Nigeria Country Analysis," 30 December 2013. <<http://www.eia.gov/countries/analysisbriefs/Nigeria/nigeria.pdf>>; Total, Ofon Phase 2. <<http://total.com/en/energies-expertise/oil-gas/exploration-production/projects-achievements/others/Ofon-Phase-2>>; Alogan, J., "Power Ministry, GE Confer Over 534mw Qua Iboe Gas Plant," Leadership, 10 March 2014. <<http://leadership.ng/business/353625/power-ministry-ge-confer-534mw-qua-iboe-gas-plant>>; World Construction Network, SPDC/NPCC -Gbaran-Ubie Phase II - Bayelsa, Nigeria, 26 June 2013. <<http://www.worldconstructionnetwork.com/projects/spdcnnpc--gbaran-ubie-phase-ii-bayelsa-nigeria/>>; Opara, S, "Contractual hitches delay construction of 800MW Chevron plant," 12 July 2012. <<http://www.punchng.com/business/business-economy/contractual-hitches-delay-construction-of-800mw-chevron-plant>>.

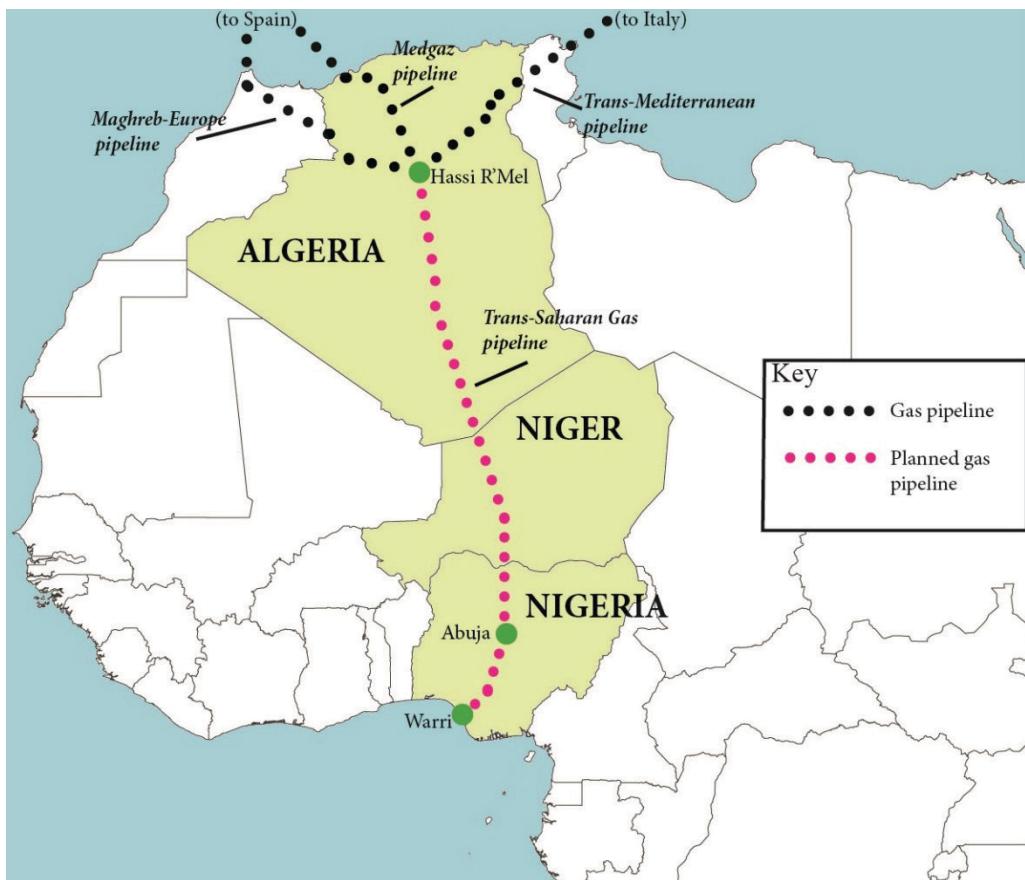
Trans-Saharan Gas Pipeline (TSGP)

NNPC, in partnership with the Algerian national oil and gas company Sonatrach, has plans to construct a TSGP, with the eventual aim of increasing supplies to Europe. This ambitious project would diversify European gas supply and improve energy security, an attractive proposition in light of the concerns European nations have over the share the Russian gas company, Gazprom, currently yields.⁶⁶ The pipeline would run for 4,200 km from the Warri refinery in the south of Nigeria, via Abuja and through Niger to the Hassi R'Mel field in Algeria. The idea behind the TSGP's construction is to link the high-production blocks in West Africa with the existing gas pipeline infrastructure in northern Africa which already connects with Europe (see Figure 3.11). A MoU was agreed between the three countries in 2002, though implementation of the project has stalled owing to concerns over security and its commercial viability in the current energy market, given the estimated USD 15 billion cost. The TSGP project is currently under review, and if given the go-ahead, the potential for growth in the Nigerian gas industry is clear.⁶⁷

66 Southworld.net, EU/Africa - Trans-Saharan Pipeline, April 2012. <http://www.southworld.net/newtest/index.php?option=com_k2&view=item&layout=item&id=214>.

67 Orediein, O., Nigeria to review Trans-Saharan gas pipeline plan, Hydrocarbon Processing, 5 September 2013. <<http://www.hydrocarbonprocessing.com/Article/3203147/Nigeria-to-review-Trans-Saharan-gas-pipeline-plan.html>>.

Figure 3.11: Proposed Trans-Saharan Gas Pipeline route



Source: Base map from Free-Vector Maps.com
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Dangote oil refinery

Africa's richest man, Aliko Dangote, has signed multi-billion USD deals with banks to finance the construction of an oil refinery, fertiliser and chemical plants in Nigeria. The refinery would be built in the south-west of Nigeria and is expected to be completed by 2016, according to Dangote.⁶⁸ The 400 Mbbl/d refining capacity of the plant would nearly match Nigeria's current total refining capacity.

Nigeria's recent history is full of proposed oil refineries which fail to be realized.⁶⁹ However, Dangote's project is less likely to be susceptible to the failures of other oil refinery proposals in the country because Dangote does not hold the same interest in protecting the African import oil market as previous international investors might have had. He has investments in other related industries, such as cement and telecommunications. There is still potential for bureaucratic delays but it is less likely that the private investor in this scenario will withdraw.

In 2010, Nigeria and China also signed a USD 23 billion deal to build three oil refineries

68 "Nigeria's Dangote signs deal to build oil refinery," BBC News, 4 September 2013. <<http://www.bbc.co.uk/news/world-africa-23960843>>.

69 Muhammad, H., "Nigeria: Why Nine Refineries Projects Stalled," AllAfrica, 14 January 2013. <<http://allafrica.com/stories/201301140390.html?viewall=1>>.

in Lagos, Kogi and Bayelsa whose total capacity would be 750 Mbbl/d.⁷⁰ However, as of 2013, development of the refineries at Kogi and Bayelsa stalled and only the 350 Mbbl/d refinery at Lagos will go ahead, following the recommendations of the National Refineries Special Task Force.⁷¹ It is hoped that the Lagos refinery will be completed in 2016.

Brass LNG plant

The NNPC holds a 49 per cent stake of the Brass LNG project with ENI International (17 per cent), Phillips (Brass) Limited (17 per cent) and Brass Holdings Company Limited (17 per cent). The planned LNG plant will be constructed on the Island of Brass, Bayelsa State in the central Niger Delta area but engineering work is still under way and there is currently no timeline for project development.⁷² The project will have a production capacity of 10 Mtpa.

3.3 Laws and regulations

Since the Petroleum Act was enacted in 1969, control and ownership of all oil and gas in Nigeria has fallen under the State. This ownership was further reinforced in 1979 under Section 40(3) of the Constitution of the Federal Republic of Nigeria. The NNPC is the national oil company through which the Nigerian Government runs the oil and gas industry. The NNPC is regulated by the Petroleum Inspectorate, a branch of the Ministry of Petroleum Resources.⁷³ At present, there is no cohesive strategy or law governing the oil and gas industry in Nigeria, with a number of different laws and Acts and their descendants governing the industry (see Table 3.4).

Table 3.4: Major legislation influencing the Nigerian oil and gas sector

Law	Year, with amendments	Description
Petroleum Profit Tax Act	1959, amended in 1967, 1970, 1973 and 1979	This Act governs taxation of companies involved in upstream petroleum operations.
Mineral Oils (Safety) Regulations	1963	Safety regulations for petroleum exploration and exploitation are provided.
Oil Pipeline Act	1956, amended in 1965	This Act governs licensees and the installation of oil pipelines.

70 "Nigeria and China sign \$23bn deal for three refineries," BBC News, 14 May 2010. <<http://www.bbc.co.uk/news/10116945>>.

71 Amanze-Nwachukwu, "FG May Dump Bayelsa, Kogi Greenfield Refinery Project as Only Lagos Viable," This Day Live, 20 July 2013. <<http://www.thisdaylive.com/articles/fg-may-dump-bayelsa-kogi-greenfield-refinery-projects-as-only-lagos-viable/154852/>>.

72 Total, "The Brass LNG Project (Nigeria)," 2013. <<http://total.com/en/energies-expertise/oil-gas/exploration-production/projects-achievements/lng/brass-lng>>; International Gas, April 2007. <<http://www.igu.org/gas-knowhow/publications/igu-publications/publications/mag/apr07/p177-201.pdf>>.

73 Federal Republic of Nigeria, Department of Petroleum Resources, History. <<http://dprnigeria.org.ng/about-dpr/history-of-dpr/>>.

Petroleum Act	1969	This Act details the process for licences for oil exploration, prospecting and mining; Rights of Pre-Emption; Repeals; and Transitional and Savings Provisions.
Petroleum (Drilling and Production) Regulations	1969, amended in 1973, 1979, 1995, 1996	These regulations detail the obligations for prospecting and mining licences, including safety.
Petroleum (Amendment) Decree	1969	This decree is the referencing legislation guiding all petroleum industry operations in Nigeria.
Nigerian National Oil Corporation (NNOC) Decree No 18	1971	This decree established the NNOC, forerunner of the NNPC, to increase indigenous worker participation. NNOC also claimed shares of foreign oil companies for the state.
Nigerian National Petroleum Corporation Decree	1977	Under this decree, the NNOC and the Ministry of Petroleum Resources (MPR) were merged to increase state participation in the oil and gas industry.
Associated Gas Re-injection Decree	1979, amended in 1985	This legislation compels all companies producing oil and gas to have plans for the implementation of gas re-injection.
Associated Gas Framework Agreement (AGFA)	1992	This framework provides fiscal incentives for utilization of natural gas.
Financial (Miscellaneous Taxation Provision) Act	1998	This Act covers oil and gas taxation.
Financial (Miscellaneous Taxation Provision) Amendment Act	1999	This Act was an amendment to oil and gas taxation.
Nigeria Liquefied Natural Gas (NLNG) Act	1999	This Act conferred pioneer status on NLNG (composed of 4 stakeholders: NNPC, Shell Gas BV, Total LNG and Eni International), exempting it from certain taxes, duties and levies.
Downstream Gas Act (DGA)	2005	The Act addresses legal, regulatory, institutional and policy constraints on investment in downstream gas in Nigeria.
Natural Gas Fiscal Reform (NAGFRA) Act	2005	This Act covers gas industry taxation

Nigerian Oil and Gas Industry Content Development Act	2010	This Act sets out local content legislation, intended to increase Nigerian participation in the sector.
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Source: "Petroleum Industry Bill: In Whose Interest?" ThisDay Live, 6 August 2013. <<http://www.thisdaylive.com/articles/petroleum-industry-bill-in-whose-interest-/155566/>>.

3.3.1 Petroleum Industry Bill

First proposed in 2008, the Petroleum Industry Bill (PIB) sought to counteract legislative disjointedness and establish a comprehensive legal and regulatory framework with the aim of improving transparency and boosting revenue for the Nigerian oil industry. Since its inception, the PIB has gone through several iterations and it has not yet been passed by the Nigerian Government. There are currently multiple versions in circulation which complicates its acceptance. There is also a general lack of support for the Bill by industry stakeholders who fear that it will have a detrimental effect on their interests. This uncertainty over the last few years has led to a slowing of investment by foreign companies, who do not know the extent to which they will be taxed.⁷⁴ The stated objectives of the PIB (Draft, 2012) are as follows:⁷⁵

- Creating a conducive business environment for petroleum operations
- Enhancing exploration and exploitation of petroleum resources for the benefit of Nigerians
- Optimizing domestic gas supplies particularly for power generation and industrial development
- Establishing a progressive fiscal framework that encourages further investment in the petroleum industry
- Optimising revenue accruing to the Government
- Establishing commercially-oriented and profit-driven oil and gas entities
- Deregulating and liberalizing the downstream petroleum sector
- Creating efficient and effective regulatory agencies
- Promoting openness and transparency in the industry
- Encouraging the development of Nigerian content.

Mark Ward, the managing director of ExxonMobil's Nigerian unit, voiced concerns over PIB in 2013.⁷⁶ He claimed that Nigeria would be imposing one of the world's harshest fiscal regimes by increasing royalties and taxes, and lowering allowances or incentives. He argued that the proposed taxes could cause a 25 per cent drop in oil production. The PIB has the potential to increase the Government's share of oil profits to as much as 96 per

⁷⁴ Madueke, D.A., "Petroleum Industry Bill: In Whose Interest?" ThisDay Live. 6 August 2013. <<http://www.thisdaylive.com/articles/petroleum-industry-bill-in-whose-interest-/155566/>>.

⁷⁵ Federal Republic of Nigeria, The Petroleum Industry Bill 2012. <<http://www.nigeria-law.org/Legislation/LFN/2012/The%20Petroleum%20Industry%20Bill%20-%202012.pdf>>.

⁷⁶ Kennedy, C., "Nigeria's Oil Industry Threatened by Petroleum Industry Bill," Oil Price, 25 August 2013. <<http://oilprice.com/Latest-Energy-News/World-News/Nigerias-Oil-Industry-Threatened-by-Petroleum-Industry-Bill.html>>.

cent, and that its share in natural gas profits will increase from 30 per cent to 80 per cent. For IOCs, the proposed fiscal terms render further exploration economically unfeasible. IOCs have expressed further worries that under the new laws all penalties would be set by the Petroleum Minister, and the President would have the power to award licenses personally, bypassing the competitive bidding process. They worry that under the PIB, there is no security for existing contracts and no independent, unbiased arbitration for resolving disputes. Since then, the Petroleum Minister has been in discussions with IOCs to try to reach fair policies where both government and IOCs stand to gain.

3.3.2 Local content law

Only companies incorporated in Nigeria can be granted oil prospecting or exploration licences or oil mining leases. However, there is no explicit requirement for companies to be controlled by Nigerians in order to be awarded such licenses. The Nigerian Oil and Gas Industry Content Development Act, 2010 requires that “preference be given to Nigerian independent operators in the award of oil blocks, oil field licences, oil lifting licences and in all oil and gas projects for which contracts are to be awarded, subject to the fulfilment of certain conditions specified by the Minister of Petroleum.”⁷⁷ The main features of the act are the following:

- Nigerian companies are to be preferred for new oil blocks and licensing
- The minimum Nigerian content required for the award of certain oil and gas contracts is subject to Content Board oversight and approval
- Operators are required to provide and transfer jobs to Nigerians, and carry out training programmes. Employment of foreign staff is limited to 5 per cent of management positions, and Nigerian subsidiaries of international companies are to own 50 per cent of assets used in operations
- Operators and contractors are required to retain 10 per cent of total revenues from their operations in Nigeria in a Nigerian bank account
- Only Nigerian financial, legal and insurance services are to be used in the oil and gas industry (certain exemptions apply)
- There are new and expanded reporting requirements for IOCs.⁷⁸

Section 3(2) and Section 11 of the Local Content Act 2010 outline the minimum levels for Nigerian content. The specifications highlight several criteria that have to be followed. This includes the number of Nigerian man-hours used and the amount of money spent on Nigerian companies or services. The threshold of local content in terms of both workforce and local investment is determined by various factors, which include the type and duration of the project, the weight, size and volume of certain goods and the total amount of local expenditure in relation to the procurement of local goods and services.⁷⁹

⁷⁷ Hogan Lovells, Foreign Investment in Nigeria – preliminary legal issues, March 2013. <http://www.hoganlovells.com/files/Publication/b45cd8d0-8481-4d52-ac2e-044ae2d08cac/Presentation/PublicationAttachment/fd65d5e4-1855-4e50-8ba5-067c6a106cc0/Foreign%20Investments%20in%20Nigeria_preliminary%20legal%20issues.pdf>.

⁷⁸ DLA Piper, Briefing Note: Implications of the Nigerian Oil and Gas Industry Content Development Act 2010, May 2011. <http://www.dlapipertradefinance.com/export/sites/dtf/downloads/Trade_Finance_Nigeria_Content_Act_May_2011.pdf>.

⁷⁹ Ogunbanjo, A., “An Overview of the Nigerian Oil and Gas Industry Content Development Act 2010” Mondaq. 9 April 2010. <<http://www.mondaq.com/x/99294/Oil+Gas+Electricity/An+Overview+Of+T>>

Some services, for example directional surveying services, cutting injections, cutting disposal services, waste disposal, drainage services and industrial cleaning services, are required to use a workforce composed wholly of Nigerians. Other services, such as disposal, distribution and waste transport, well head safety panels and certain seismic data acquisition services require 100 per cent local investment.

All operators, alliance partners and contractors must comply with the minimum local content requirements. Companies can deviate from the minimum requirements when they can prove that local capacity is inadequate, and must be authorised by the Ministry of Petroleum Resources. However, exemptions are only granted for three year periods, after which the necessary local capacity is expected to have been developed.

Unless companies can demonstrate that a specific expertise is not found in the local workforce, companies have to hire Nigerian workers. Most positions within finance and human resources are held by Nigerians. Positions for foreign workers must be approved by NAPIMS and each IOC and international supplier must negotiate its foreign worker allotment with the agency which can be a long process. The primary means by which IOCs and international suppliers can adhere to this local law is through partnerships with local companies, and by providing training to the indigenous workforce.

3.4 Operators and concessionaires

3.4.1 International oil companies (IOCs)

There are many IOCs involved in the oil and gas industry in Nigeria. Shell, ExxonMobil, Chevron and Total are the four largest operating companies (see Table 3.5). Although there has been evidence, such as the sale of oil blocks, to suggest that these companies might want to abandon operations in Nigeria, the evidence is offset by large investments in projects which reveal the intention of these companies to continue operating in Nigeria. Other companies, including Eni and Marathon, also operate in the country. Eni produces approximately 96 Mbbl/d, although they have suffered from shut-in incidents in the Brass River terminal since the end of 2006. There are also several smaller companies operating in Nigeria. Afren Energy Resources and Amni International are two such examples.

Table 3.5: Major IOCs active in Nigeria

Company	Production (MMbbl/d)	Notes
Shell	1.2	Shell has been active in Nigeria since 1936. Shell operates in Nigeria through the Shell Petroleum Development Company Limited (SNEPCo). SNEPCo was formed in 1993 to develop Nigeria's deepwater oil and gas resources. It operates under a Production Sharing Contract (PSC) with NNPC. SNEPCo operates the Bonga deepwater oil and gas project and is a venture partner in the Erha deepwater oil and gas project with ExxonMobil.
ExxonMobil	0.8	ExxonMobil is the second largest IOC. It operates Upstream as Mobil Producing Nigeria (MPN) and Esso Exploration and Production Nigeria Ltd (EEPNL), under PSCs with NNPC. Its operations are primarily located in the less vulnerable deepwater offshore areas.
Chevron Nigeria Limited	0.52	Chevron is the third largest oil producer and operates under its subsidiary in a Joint Venture arrangement with NNPC. The company holds 40 per cent interest in 13 concessions. Most of its oil projects are in shallow water and onshore in the Niger Delta. Chevron also has interests in deepwater projects, notably at the Agbami deepwater project.
Total	0.18	Total operates several offshore projects and one onshore. Total is the operator of the Usan deepwater field that came online in July 2012.

Source: US Energy Information Administration, "Nigeria Country Analysis," 30 December 2013. <<http://www.eia.gov/countries/analysisbriefs/Nigeria/pdf>>.

Shell

Shell Petroleum Development Company (SPDC) is the largest fossil fuel company in Nigeria, producing 39 per cent of the country's oil. The company operates 6,000 km of pipe and flowlines, 87 flow stations, 8 gas plants and 1,000 wells mainly in the Niger Delta region. Currently the company has 28 oil mining leases (OMLs) both onshore and offshore and is the operator of a joint venture agreement with NNPC, Total Exploration and Production Nigeria Ltd and Nigerian Agip Oil Company Ltd.⁸⁰ Shell Nigeria Gas operates a transmission and distribution network of roughly 80 km. Table 3.6 summarises some of Shell's major upcoming projects in Nigeria.

80 Shell, Shell at a glance. <<http://www.shell.com.ng/aboutshell/at-a-glance.html>>.

Table 3.6: Shell's main oil and gas projects in Nigeria

Project	Interest (Per cent)	Details
Bonga Deepwater Project, Niger Delta	55	Lying 120km offshore, the Bonga FPSO has the capacity to produce more than 250 Mbbl/d and 150 MMcf/d. By the end of 2012, Bonga had produced about 450 MMbbl of oil.
Afam gas and power supply	55	Afam power plant has increased Nigeria's electricity generating capacity and gas supply by around 14-24 per cent. Afam VI's gas turbines generate up to 450 MW of power. The gas comes from the new Okoloma plant, capable of processing 240 MMcf/d of gas from the Okoloma field.
Bonny Terminal Upgrade	25.6	SPDC has upgraded and expanded the Bonny crude oil terminal - the largest of its kind in Africa. The new facilities have more than doubled the amount of oil it can process and export to 1.25 MMbbl/d. The Bonny facility is now one of the most technologically advanced terminals in Africa and gives Nigeria the potential to deliver crude oil exports for 25 years.
Trans-Niger Pipeline (TNP) upgrade	30	Under a JV, SPDC has agreed a USD 1.5 billion investment to improve the security of the TNP which pumps to the Bonny Terminal and is critical to the Afam VI power plant.
The Gbaran Ubie Integrated Oil and Gas Project	25.6	The Nigeria Liquefied Natural Gas (NLNG) supplies project is comprised of the Gbaran-Ubie and Soku fields. Phase 1 of the Gbaran-Ubie project began producing oil and gas in June 2010. It produces more than 50 Mbbl/d of oil. Funding of USD 2.4 billion has been agreed for Phase 2 under the NNPC and SPDC JV. The next phase includes five gas supply and infrastructure projects, and a domestic power plant. It is expected to be completed by the end of 2016. ¹¹

Sources: Shell, Deepwater Nigeria – Bonga Development, April 2013. <<http://s05.static-shell.com/content/dam/shell-new/local/country/nga/downloads/pdf/2013bnotes/deepwater.pdf>>; Shell, Afam Power Plant. <<http://www.shell.com.ng/aboutshell/lets-go-campaign/afam.html>>; Shell, Bonny Terminal Integrated Project. <<http://s02.static-shell.com/content/dam/shell-new/local/country/nga/downloads/pdf/2013bnotes/bonny.pdf>>; Shell, SPDC sets out its future intent for Nigeria, 21 June 2013. <<http://www.shell.com/global/aboutshell/media/news-and-media-releases/2013/spdc-sets-out-future-intent-for-nigeria.html>>; Shell, The Gbaran Ubie Integrated Oil and Gas Project, April 2011. <<http://s03.static-shell.com/content/dam/shell/static/nga/downloads/pdfs/briefing-notes/gbaran.pdf>>; Shell, SPDC sets out its future intent for Nigeria, 21 June 2013. <<http://www.shell.com/global/aboutshell/media/news-and-media-releases/2013/spdc-sets-out-future-intent-for-nigeria.html>>; World Construction Network, SPDC/NPCC –Gbaran-Ubie Phase II – Bayelsa, Nigeria, 26 June 2013. <<http://www.worldconstructionnetwork.com/projects/spdcnpsc---gbaran-ubie-phase-ii-bayelsa-nigeria/>>.

ExxonMobil

ExxonMobil structures its business through individual operating companies. Mobil Producing Nigeria Unlimited (MPN) operates through Joint Venture agreements with the NNPC. Esso Exploration and Production Nigeria Limited was established in 1993 and has a PSC with NNPC for OML 133, as well as operating the Erha deepwater oil and gas development. Mobil Oil Nigeria is in charge of downstream product marketing with over 200 retail outlets throughout the country. Combined these subsidiaries employ over 2,000 people, 90 per cent of whom are local Nigerians.⁸¹ In 2011 MPN invested USD 11 billion in Nigeria's petroleum sector.⁸²

Table 3.7: ExxonMobil's main oil and gas projects in Nigeria

Project	Interest (Per cent)	Details
Erha/Erha North	56.25	Erha is a deepwater offshore project. Shell holds the other 43.75 per cent interest. Esso is the operator. There are more than 30 subsea wells tied to an FPSO vessel. Production stands at 190 Mbbl/d and 300 MMcf/d. The scheduled start up for phase 2 of Erha North is 2016; 50 Mbbl/d additional production capacity is expected.
Bonga Northwest, North and Southwest	20	Production started in 2005 in Bonga Northwest. In 2007, production was 200 Mbbl/d. There is a planned FPSO development with a dedicated gas export line for Bonga North (which ExxonMobil only hold 16 per cent interest in) and for a FPSO vessel with the same design as Bonga Southwest.
Bosi	56	Production has not begun yet. A spread-moored FPSO vessel with associated subsea developments is planned.
OPL 214	20	ExxonMobil is the operator. Oil was discovered in Uge field in 2005, development planning continues. Phase 3 drilling took place in early 2012. The other partners are Chevron (20 per cent), Phillips Deepwater Exploration Nigeria Limited (20 per cent), Svenska (20 per cent), Nigerian Petroleum Development Company (15 per cent) and Sasol (5 per cent).
OPL 223/OML 138/OML 139	Various	ExxonMobil is planning additional wells to assess potential in these blocks.

81 Exxon Mobil, Who we are. <http://www.exxonmobil.com.ng/nigeria-english/pa/about_who.aspx>.

82 The Free Library, Nigeria – ExxonMobil Operations, August 2011. <<http://www.thefreelibrary.com/NIGERIA+-+ExxonMobil+Operations-a0263669054>>.

Usan (OML 138)	30	Production started in early 2012 using an FPSO vessel. Proven and probable reserves of Usan were estimated to be in excess of 500 MMbbl of oil. The field is operated by Total E&P Nigeria, a wholly owned subsidiary of Total (20 per cent). Partners include Chevron Petroleum Nigeria (30 per cent) and Nexen Petroleum Nigeria (20 per cent).
Qua Iboe	40	Production averages at 400 Mbbl/d. An agreement was signed in April 2013 to develop a 500 MW power plant at the Qua Iboe Terminal, as well as a 56km transmission line to connect it with the national power grid at Ikot Abasi.
Satellite Field Development Phase 1	40	The development started in 2012 with 3 offshore wellhead platforms for the Abang, Itut and Oyot fields.
East Area Additional Oil Recovery Project (OML 67, 68 and 70)	Various	ExxonMobil made a USD 1.3 billion investment in mature operation to extend field life in 2005. This included a gas compression complex, seven platforms and more than 161 km of distribution pipeline.
East Area Natural Gas Liquids (NGL II) Project	51	This project is an expansion of the NNPC/MPN Oso-NGL JV. Production is currently 720 Mbbl/d NGL. ExxonMobil are involved in the expansion of onshore facilities at Bonny Terminal. MPN, an ExxonMobil affiliate, is the operator.

Source: ExxonMobil, ExxonMobil in Nigeria. <<http://www.exxonmobil.com.ng/Nigeria-English/PA/default.aspx>>. Subsea IQ, Erha, 5 September 2013. <http://www.subseaiq.com/data/Project.aspx?project_id=658>; "ExxonMobil Signs Agreement on 500MW Power Plant," Nigeria NewsDay, 26 April 2013. <<http://nigerianewsday.com/news-a-commentary/energy/2502-exxon-mobil-signs-agreement-on-500mw-power-plant>>; Offshore Technology, Exxon-East Area NGL II, Nigeria. <http://www.offshore-technology.com/projects/exxon_east/>.

Chevron

Chevron is the third largest oil producer in Nigeria and invests over USD 3 billion in Nigeria each year. Business is conducted through the subsidiary Chevron Nigeria Ltd. The company operates 13 concessions with a 40 per cent interest under a JV with NNPC. Interests are located onshore, swamp lands, near offshore and deepwater.

Table 3.8: Chevron's main oil and gas projects in Nigeria

Project	Interest (Per cent)	Details
Usan Offshore Field (OPL 222)	30	Chevron has a non-operator working interest in this field, which lies approximately 100 km south of Port Harcourt in water depths ranging from 750 m to 850 m. The development of the Usan field involves 23 production wells and 19 water and gas injection wells connected to a 2 MMbbl capacity FPSO vessel by subsea lines and risers. Production commenced in February 2012.
OML 86 and 88	40	Chevron is currently reviewing 3D seismic data collected for these shallow water blocks with a view to develop them.
Agbami	67.3	An offshore subsea development with wells tied back to a FPSO vessel. Chevron is the operator of this facility. It is a deepwater development and production started in 2008. Phase 2 development production began in 2012 with drilling expected to continue until 2016.
Aparo Field and Bonga Southwest Field	40	Both areas share common geology and are expected to be developed concurrently with proposed subsea wells tied back to an FPSO vessel. The initial design phase began in 2013.
OPL 223	27	Chevron has a non-operator working interest of this site. Exploration wells were drilled in the 3Q of 2012.
Nsiko (OML 140)	95	Chevron is the operator of this deepwater region. Further exploration is planned for 2014.
Escravos Gas Plant (EGP)	40	The expansion of EGP and a USD 2.4 billion investment in a new pipeline to eliminate flaring is expected to be completed by 2016.
Escravos Gas to Liquids (EGTL) facility	75	The EGTL facility is a USD 9.5 billion investment. The project will process 325 MMcf/d from the EGP expansion and produce 33 Mbbl/d of liquids (gas to liquids) at capacity.
Sonam Field Development	40	Sonam field is operated by Chevron and will produce 30 Mbbl/d of liquid, and will use the EGP facilities to deliver 215 MMcf/d of natural gas to the domestic market. The project is expected to start up in 2016.

Source: Chevron, Nigeria, April 2013. <<http://www.chevron.com/countries/nigeria/>>; Off Shore Technology, Usan offshore oil field, Nigeria. <<http://www.offshore-technology.com/projects/usan/>>; Total, “Total Upstream in Nigeria,” 2010. <http://www.ng.total.com/media/corporate_brochure/Corporate_brochure.pdf>; “Partners Move to Develop Usan Field Off Nigeria,” Oil & Gas Journal, 29 February 2008. <<http://www>

ogj.com/articles/2008/02/partners-move-to-develop-usan-field-off-nigeria.html; Chevron, Nigeria Fact Sheet, April 2013. <<http://www.chevron.com/documents/pdf/nigeriifactsheet.pdf>>.

Total

Total is Nigeria's fourth largest oil and gas producer with over 50 permits and 9 operating licenses. Their portfolio includes shares in projects in OMLs 58, 99, 100, 112, 117, 118 and 102, 130, 136, 139, 221, 223 and 257. Total also has a 45.9 per cent interest in Block 1 in the Sao Tome-Nigeria Joint Development Zone (JDZ).

Table 3.9: Total's main oil and gas projects in Nigeria

Project	Interest (Per cent)	Details
Obagi Field (OML 58)	40	NNPC holds a 60 per cent interest. The onshore project started production in 1966.
Odudu Field (OML 100)	40	Total is the operator. NNPC holds 60 per cent. The offshore project started production in 1993.
Ofon Field (OML 102)	40	Total is the operator. NNPC holds 60 per cent. The offshore project started production in 1997. Phase 2 of the offshore Ofon Field development began in early 2012 and will tap the undeveloped reserves at the Ofon Field. The development will mostly focus on producing natural gas.
Amenam/Kpono Unit (OMLs 99 and 70)	40	Total is the operator. NNPC holds 60 per cent. The offshore project started production in 2003.
Akpo Field (OML130)	24	Total is the operator. China National Offshore Oil Corporation (45 per cent), Petrobras (16 per cent), NNPC (10 per cent) and Sapetro (5 per cent) are partners in a PSC. The deep offshore project started production in 2009.
Usan Field (OML 138)	20	Partners are Chevron (30 per cent), Esso (30 per cent) and Nexen (20 per cent). Total is the operator and production started in 2012. Maximum production capacity is 180 Mbbl/d.
Egina Oil Field (OML 130)	24	The Egina oil field is located 150km off the coast of Nigeria. The field is being developed by Total Upstream Nigeria in partnership with NNPC (10 per cent), CNOOC (45 per cent), Sapetro (5 per cent) and Petrobras (16 per cent). Egina is Total's third deepwater offshore development in Nigeria. The field is currently under development and production is scheduled for 2017.

Source: Total, Total in Nigeria. <<http://www.ng.total.com>>; Offshore Technology, Egina Oil Field, Nigeria. <<http://www.offshore-technology.com/projects/egina-field>>.

3.4.2 Domestic companies

The operations of domestic oil companies have expanded in recent years, as the instability in oil producing regions such as the Niger Delta have driven IOCs further offshore or into other African countries (see Section 3.1.1), leaving a hole in the market for domestic companies to fill.⁸³ There are consequently several indigenous oil and gas companies operating in Nigeria, some of whose operations are summarised in Table 3.10.

Table 3.10: Nigerian domestic oil and gas companies

Company	Details
Oando Plc	Oando Plc is Nigeria's largest non-government owned company in the energy sector, and operates across the Upstream, Midstream and Downstream. Its production operations are carried out by Oando Exploration & Production Ltd (OEPL) and Oando Energy Resources (OER). OEPL operates OML 236 (Onshore) and 278 (Shallow water) with 95 per cent and 60 per cent shares respectively, and holds interests in several other blocks, including 45 per cent in OML 56. OER also holds equity in six blocks. On 17 th January 2014, the company's estimated worth on the Nigerian Stock Exchange was USD 1.4 billion, and its post-tax profits for 2012 were approximately USD 68.5 million.
Famfa	Famfa is one of the leading indigenous oil and gas exploration and production companies in Nigeria. It primarily operates in the deepwater Agbami field, which has reserves expected to last until 2024.
Amni International Petroleum Development Company	Amni is an independent and indigenous oil and gas exploration and production company based in Nigeria. They operate the Ima (located in OML 112 and 117), and Okoro and Seta (OML 112) shallow water fields in the Niger Delta.
Frontier Oil Ltd	Frontier Oil Ltd currently holds only OML 13 (Onshore Uquo), where they are conducting development operations.
Moni Pulo	Moni Pulo holds the sole licence to OML 114, a shallow water field off the coast of Nigeria. Moni Pulo took over operations in 2002.
Energia Ltd	Energia Ltd operates the Ebendo/Obodeti (formerly Obodugwa/Obodeti) Marginal Fields in OML 56, with a 55 per cent equity share, in a JV with Oando Plc. They brought the field online in 2009, and it was producing 6 Mbbl/d, as of June 2013.
Suntrust Oil Ltd	Suntrust Oil Ltd holds a 30 per cent interest in the onshore Umusadege Field in OML 56, operated by Midwestern Oil and Gas Plc.

⁸³ "Why Nigerian Oil Theft Isn't All Bad: As Foreign Oil Corporations Back Out, Domestic Companies Move In," International Business Times, 19 September 2013. <<http://www.ibtimes.com/why-nigerian-oil-theft-isnt-all-bad-foreign-oil-corporations-back-out-domestic-companies-move>>.

Source: Oando PLC, Oando Exploration & Production, Asset Portfolio. <<http://www.oandopl.com/oando-exploration-and-production/assets-portfolio/>>; Oando PLC, Financial Profile. <<http://www.oandopl.com/investor-relations/financial-profile/>>; Oando PLC, Financial Performance, 2012. <<http://www.oandopl.com/about-oando/financial-performance/>>; Famfa Oil. <<http://www.famfa.com>>; Amni International Petroleum Development Company. <<http://www.amnipetroleum.com>>; Frontier Oil, About Us. <<http://www.frontieroilltd.com/pages.php?add=about>>; Moni Pulo. <<http://www.monipulo.com/operations.html>>; Energia Ltd., Our Operations. <<http://new.energiang.com/our-operations/>>; Suntrust Oil, Overview of Umusadege Field. <http://suntrustoil.com/?page_id=287>; Mart Resources Inc., Umusadege field. <<http://www.martresources.com/operations/umusadege-field/>>.

3.4.3 National oil companies

Nigerian National Petroleum Corporation (NNPC)

NNPC was created in 1977 after the NNOC was merged with the Ministry of Petroleum Resources under Decree No. 33. The NNPC is involved throughout the oil and gas industry and employs roughly 24,000 as of 2009.⁸⁴ NNPC manages JVs between the Government and foreign multinationals. NNPC chairs the Management Committee in PSCs with private companies. Under JVs, NNPC owns the concession but the contractor normally fully operates the field and its development.

NNPC has two partially-owned subsidiaries and 16 associated companies.⁸⁵ In 1988, NNPC was divided into 12 strategic commercial business units, covering the entire spectrum of oil and gas operations. Major subsidiary companies include:

- Nigerian Petroleum Development Company (NPDC)
- The Nigerian Gas Company (NGC)
- The Products and Pipelines Marketing Company (PPMC)
- Integrated Data Services Limited (IDSL)
- National Engineering and Technical Company Limited (NETCO)
- Hydrocarbon Services Nigeria Limited (HYSON)
- Duke Oil
- NNPC Retail
- Warri Refinery and Petrochemical Co. Limited (WRPC)
- Kaduna Refinery and Petrochemical Co. Limited (KRPC)
- Port Harcourt Refining Co. Limited (PHRC)

NNPC is a major equity holder in seven JVs, six of which produce 97 per cent of Nigeria's crude oil.⁸⁶ Through a subsidiary company, Nigerian Petroleum Development Company (NPDC), the NNPC are involved in 23 concessions:⁸⁷

⁸⁴ Nigeria Oil & Gas, "The Directory of the Nigeria Oil & Gas Industry," 2011. <http://www.nigeria-oil-gas.com/directory_of_the_nigerian_oil_&_gas_industry-33-1-2-c.html>.

⁸⁵ Nigerian National Petroleum Corporation. <<http://www.nnpcgroup.com>>.

⁸⁶ Federal Republic of Nigeria, Nigerian Investment Promotion Commission, Joint Ventures. <<http://www.nipc.gov.ng/venture.html>>.

⁸⁷ Nigerian Petroleum Development Company Ltd., Company Profile. <<http://npdc.nnpcgroup.com/>>

- 16 oil mining licenses and 7 oil prospecting licenses
- 100 per cent ownership of five blocks (64, 65, 66, 111, 119)
- 55 per cent equity in eight blocks (4, 26, 30, 34, 38, 40, 41, 42)
- Varied interests in seven deepwater concessions
- Non-equity operations in three blocks (selected NNPC JV fields)
- Currently drilling in two locations: one offshore Okono B in OML 119 and one onshore, Oredo 12 in OML 111.

Nigerian Department of Petroleum Resources (DPR)

DPR has the statutory responsibility of ensuring compliance with laws, regulations and guidelines in the oil and gas sector (including NNPC and its subsidiaries). As a supervisory body, it has the power to revoke operator licences for failure to comply with regulations. The DPR:

- Supervises all industry operations
- Monitors and ensures compliance for health, safety and environmental regulations
- Advises the Government on public policy
- Processes industry applications for leases, licences and permits.

Diezani Alison-Madueke, the Nigerian Minister of Petroleum Resources has outlined a USD 130 billion investment plan for the period 2012-2017 that includes just over 2,000 km of oil and gas pipeline for domestic supply, a petrochemical plant, new fertilizer and manufacturing plants, and three Greenfield refineries.⁸⁸

Energy Commission of Nigeria (ECN)

ECN produces strategic plans and coordination on national energy policy, with recommendations to Government on the exploitation of new resources. Consequently, ECN has a high level of influence over natural resource development in Nigeria.

The major objectives of the ECN are to:

- Guarantee increased contribution of the energy sector to national income and the wider economy
- Guarantee adequate, sustainable and optimal supply of energy at appropriate cost and in an environmentally responsible manner
- Promote efficient consumption of energy sources
- Promote indigenous acquisition of energy technology and managerial expertise, as well as participation in the energy sector

88 AboutUs/CompanyProfile.aspx>. Tubb, R., "2012 Worldwide Pipeline Construction Report," Pipeline & Gas Journal, Vol. 239 No.1, January 2012. <<http://pipelineandgasjournal.com/2012-worldwide-pipeline-construction-report?page=show>>.

- Promote increased investment and the development of energy sector industries with private sector participation.

Joint Ventures (JV) and production sharing contracts (PSC)

In Nigeria, JVs align two or more oil companies with the NNPC in an agreement for joint operation of an oil block. The JV contract sets out the level of participation of each party, the interests and obligations for each party and the ownership of the production facilities and assets. One of the partners is designated the operator, whilst all parties share the cost of operations. Costs and benefits are shared between the various parties according to each party's equity share. Nearly all (97 per cent) of the oil was produced under JVs in 2001, but has since fallen to accounting for 60 per cent of oil production in 2011.⁸⁹

PSCs were introduced in 1993 to encourage foreign investment in offshore developments. Under a PSC, the NNPC maintains the oil concession, while the contractor is responsible for the exploration risks and costs, and for site development. These costs are recouped as and when the site becomes profitable. Oil profits (after costs) are shared between the NNPC and the contractor. PSC contracts are issued for a term of 30 years; 10 years for the exploration phase and 20 years for the oil mining phase. The minimum work programme expenditure during the exploration period is required to be USD 24 million for one to three contract years, USD 30 million for four to six contract years, and USD 60 million for more than seven contract years.⁹⁰

3.5 International and domestic suppliers

3.5.1 Overview

Many major international suppliers are active in Nigeria, and hold offices in the country. Alongside the international companies, a significant number of indigenous companies are also involved as suppliers for the oil and gas sector, primarily with engineering services rather than heavy machinery.

International suppliers

Siemens is one of the major suppliers of equipment in Nigeria. They established their first representative office in the country in 1970, and now have another office in Abuja, as well as a factory and service centre in Port Harcourt. Siemens' services range over the following sectors: offshore drilling, subsea solutions, FPSOs, pipelines, LNG, enhanced oil recovery, main motors and drives contractors, power supply and water treatment.⁹¹

ABB's operations in Nigeria are headquartered in Lagos, with branches in Abuja and Port Harcourt. In March 2011, ABB stated that it had 38 employees, with 2 expatriates in

89 Akinkide-Balogun, O., "Nigeria: Legal Framework Of The Nigerian Petroleum Industry," Mondaq, 3 April 2001. <<http://www.mondaq.com/x/10726/Legal+Framework+Of+The+Nigerian+Petroleum+Industry>>; Akinoshio, T., "Nigeria: Deepwater PCS Incentive Turns On Its Head," Africa Oil and Gas Report, 20 December 2013. <<http://africaoilgasreport.com/2013/12/in-the-news/nigeria-deepwater-psc-incentive-turns-on-its-head/>>.

90 Federal Republic of Nigeria, Nigerian Investment Promotion Commission, Production Sharing Contract (PSC). <<http://www.nipc.gov.ng/contract.html>>.

91 Siemens, Welcome to the Nigeria Oil & Gas Conference and Exhibition from February 20–23, 2012, in Abuja, February 2012. <<http://www.energy.siemens.com/mx/pool/hq/energy-topics/tradeshows/NOG/12th%20Nigeria%20Exhibition%20Invitation.pdf>>.

Nigeria. Its annual revenue was USD 35 million in 2010 from Nigeria. The company's operations are divided into five areas: power products, power systems, low voltage products, process automation, and discrete automation and motion.⁹²

GE has an office in Lagos, a GE Energy repair shop and training facility in Port Harcourt, and a GE Oil & Gas drilling and production facility in Onne.⁹³ In January 2013, GE announced its plan to invest nearly USD 1 billion to establish a new manufacturing assembly plant in Calabar, and to upgrade existing workshops in Port Harcourt and Onne.⁹⁴

Technip has presence in Nigeria through its own subsidiary in Lagos (Technip Offshore Nigeria Limited) and two affiliate companies (Neptune Maritime Nigeria Ltd and Crestech Engineering Limited) in Port Harcourt and Lagos, respectively.⁹⁵ Alstom has two offices in Nigeria, one in Lagos and the other in Abuja. Samsung Heavy Industries has only one office on the African continent, and it is located in Lagos. Daewoo Engineering & Construction have three sites in Nigeria in Port Harcourt, Lagos and Abuja.

Domestic suppliers

Oando is active in all streams of the oil and gas sector in Nigeria (see Section 3.4.2). Their headquarters are in Lagos, and they also have offices in the country's capital, Abuja. Outside of oil production, Oando provides upstream engineering services through Oando Energy Services Ltd (OESL), particularly for drilling.

Ciscon Services, an indigenous company with headquarters in Port Harcourt, provides upstream services, such as well completions. They also run a drilling tool rental service.⁹⁶ Similarly, SOWSCO Well Services, headquartered in Port Harcourt, provide well cementing and other oil-rig services.⁹⁷ Bell Oil, who has offices in both Lagos and Port Harcourt, provide piping systems and well testing services, as well as a variety of materials and equipment to companies in the oil and gas sector.⁹⁸ Ariboil, whose headquarters are in Egbu, provides equipment rental for upstream oil operations, particularly centrifuges and conveyors. It also owns a steel fabrication facility, and intends to expand the fabrication side of its operation, which could entail movement further into the mid- and downstream.⁹⁹

3.5.2 Upstream

Siemens

Siemens plans to construct an oil and gas service workshop in Port Harcourt. The plans are close to being finalised and the agreement with the Federal Government includes

92 ABB, ABB in Northern Africa. <<http://www.ng.abb.com/cawp/ngabb002/329d65d6dd216f11c125748a00605f20.aspx>>.

93 GE, "Energizing Africa." <http://www.ge-energy.com/content/multimedia/_files/downloads/GE_Energy_in_Africa.pdf>

94 Bowman, A., "Nigeria wins \$1bn General Electric manufacturing investment," Financial Times, 31 January 2013. <<http://blogs.ft.com/beyond-brics/2013/01/31/nigeria-wins-1bn-general-electric-manufacturing-investment/#axzz2ni9sQ1J6>>.

95 Technip, Locations, Nigeria. <<http://www.technip.com/en/locations/Nigeria>>.

96 Ciscon, Services. <<http://www.cisconservices.com/services/services.html>>.

97 SOWSCO, Services. <<http://www.sowesco.net/services.html>>.

98 Bell Oil, Our Services. <<http://www.belloil.com/our-services/>>.

99 Ariboil Company Ltd., Oil Field Services. <<http://ariboil.com/oilfieldServices.html>>; Ariboil Company Ltd., Steel Fabrication. <<http://ariboil.com/steelFabrication.html>>.

the construction of a 1,600 MW gas-fired power station in Lekki, Lagos. Siemens was designated an original equipment manufacturer (OEM) by the Nigerian Content Development and Monitoring Board, leading to the award of the Nigerian Content Certificate, a key requirement for bidding and winning contracts in Nigeria's oil and gas industry.¹⁰⁰ With the certificate, Siemens signed a four-year contract worth nearly USD 19 million with the SPDC to supply four centrifugal compressors for the Southern Swamp Associated Gas Solutions (SSAGS) project. This project is intended to reduce the flaring of associated gas. It is reported that the compressors would be manufactured at the Siemens Industrial Turbo machinery plant in the Netherlands.¹⁰¹

For the Oyo project, Siemens supplied a pressurized and air-conditioned electrical power control building for an FPSO vessel. The customer was Bumi Armada, a Malaysia-based international offshore oilfield service provider who owns and operates the Armada Perdana FPSO. The end user is Eni. The electrical power control building is named the 'E-house', and was delivered in 2009.¹⁰²

In 2006, Siemens was awarded an order to supply a produced water filtration system and a seawater injection system to Total Upstream Nigeria Limited for its Akpo project in offshore Nigeria. The produced water treatment system, engineered by Water Technologies, a division of the Siemens Group Industrial Solutions & Services, will reduce oil levels in the influent from 1200-1500 ppm to 30 ppm. The flow rate is designed to handle up to 150 Mbbl/d of produced water. Siemens Water Technologies also received an order for seawater electrochlorination package for controlling marine growth.¹⁰³

Daewoo Shipbuilding & Marine Engineering

The FPSO for the Agbami Oilfield was built by South Korea's Daewoo Shipbuilding & Marine Engineering. Delivered in 2007, the Agbami FPSO has the capacity to handle 250 Mbbl/d of oil, 450 MMcf/d of gas production, 450 Mbbl/d of injected water, and to store 2.15 MMbbl of crude oil.¹⁰⁴ Installed in Nigeria's largest deepwater development, the FPSO is one of the largest facilities of its kind.¹⁰⁵ The development cost was USD 1.2 billion. The topsides were subcontracted for KBR.¹⁰⁶ As part of the contract package in relation to Nigeria's local content provisions, it was agreed that 300,000 man-hours or 40 per cent of the total man-hours spent on the construction would be allocated to Nigerian companies.¹⁰⁷ For the Agbami FPSO, Dresser-Rand supplied three generator sets, three mechanical drivers and three compressors, which includes GE's engine.

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- 100 Siemens, Siemens in Nigeria. <<http://africa.siemens.com/en/siemens-in-africa/country-profiles/nigeria.htm>>.
- 101 Adegoke, O., "Siemens To Spend \$18m To Reduce Gas Flaring In Nigeria," Ventures, 28 August 2012. <<http://www.ventures-africa.com/2012/08/siemens-to-reduce-gas-flaring-in-nigeria/>>.
- 102 Siemens, Oil & Gas. <<http://www.energy.siemens.com/hq/en/industries-utilities/oil-gas/>>; Offshore Technology, Oyo Oilfield, Nigeria. <<http://www.offshore-technology.com/projects/oyo-field/oyo-field4.html>>.
- 103 "Technip Selects Siemens to Supply Produced Water Filtration and Seawater Injection Systems," Siemens, 8 June 2006. <http://www.siemens.com/press/en/pressrelease/?press=/en/pr_cc/2006/06_jun/06065330_1383576.htm>.
- 104 Offshore Technology, Agbami Oilfield, Nigeria. <<http://www.offshore-technology.com/projects/agbami/>>.
- 105 Chevron, Agbami (Nigeria). <<http://crudemarketing.chevron.com/crude/african/agbami.aspx>>.
- 106 Offshore Technology, Agbami Oilfield, Nigeria. <<http://www.offshore-technology.com/projects/agbami/>>.
- 107 Oduniyi, M. and Ezigb, O., "Daewoo Wins Contract to Build Agbami FPSO," Rigzone, 23 February 2005. <http://www.rigzone.com/news/article.asp?a_id=20570>.

Samsung Heavy Industries

The Bonga FPSO was built as a turnkey solution by Samsung Heavy Industries for the operator of the Bonga Development, SNEPC, and NNPC. Shell also awarded a UK engineering company, AMEC, a USD 490 million contract for the project management, engineering design, fabrication and integration of the topside oil and gas processing equipment. The FPSO has the capacity to process up to 225 Mbbl/d of oil and store up to 2 MMbbl of oil. AMEC installed the topside system in Tyneside, UK, and the FPSO sailed for six weeks to arrive at the Bonga field.¹⁰⁸

Hyundai Heavy Industries

Another large Korean shipbuilder, Hyundai Heavy Industries, built an FPSO for the Usan field. Awarded in February 2008, the FPSO was delivered to the field in July 2011 with the field coming online in February 2012.¹⁰⁹ The FPSO can process 180 Mbbl/d and has a storage capacity of 2 MMbbl.¹¹⁰

Hyundai built the FSO Unity for the Amenam/Kpono Unit fields in 2003. It replaced the FSO Domy. The vessel can store 2.4 MMbbl and handles 125 Mbbl/d from the two fields as well as a number of other fields.¹¹¹

For the Akpo field, a consortium of Technip and Hyundai Heavy Industries was contracted for an FPSO. With the contract price of approximately USD 1.08 billion, the scope of work includes the engineering, procurement, supply, construction and offshore commissioning of the FPSO. Technip was made responsible for the overall project management and the engineering phase while Hyundai Heavy Industries executed the FPSO's hull and topsides construction and integration. The FPSO has the capacity to produce 225 Mbbl/d of oil, with a storage capacity of 2 MMbbl.¹¹²

Mitsubishi Heavy Industries

The Knock Adoon vessel was built in 1985 by MHI, Japan. It was converted from a trading tanker to an FPSO at Dubai Drydocks. FPSO Knock Adoon replaced FPSO Knock Taggart on the Antan Field, offshore Nigeria, in October 2006. The production capacity is 60 Mbbl/d.¹¹³

KBR

An engineering, procurement and construction (EPC) contract was awarded to KBR

108 "Nigerian Bound Bonga Hailed a Major Success for AMEC," AMEC, 20 October 2003. <<http://www.amec.com/page.aspx?pointerid=f0afa06318ed42038c21cfef6cf5f5c1>>.

109 Subsea IQ, Usan, 24 Feb 2012. <http://subseaiq.com/data/Project.aspx?project_id=341>.

110 "Total puts on stream its giant deep offshore Usan project in Nigeria," Total, 14 February 2012. <<http://total.com/en/media/news/press-releases/20120224-total-puts-stream-giant-deep-offshore-usan-project-nigeria>>.

111 Total, "Amenam/Kpono first oil," 2006. <<http://www.ng.total.com/media/publications/amenam-kpono-first-oil.pdf>>.

112 "Technip awarded contract for the FPSO of the deepwater Akpo field in Nigeria," Technip, 9 May 2005. <<http://www.technip.com/en/press/technip-awarded-contract-fpsos-deepwater-akpo-field-nigeria>>; Subsea IQ, Akpo. <http://www.subseaiq.com/data/PrintProject.aspx?project_id=252>.

113 Fred.Olsen Marine Services AS, FPSO Knock Adoon. <<http://www.fredolsen-marine.com/?aid=9070754>>.

for the production facilities, including supplying and integrating the FPSO processing systems with the hull facilities, which can handle 170,000 bbl/d of oil and 100 MMcf/d of gas.¹¹⁴ The Sea Eagle FPSO was constructed for Shell's EA Development Project in 2002. The Korean companies, SOME and Smebwang Shipyard were awarded a USD 50 million contract for the fabrication, assembly, installation, hook-up and commissioning assistance of the FPSO vessel's topside facilities which were comprised of nine pre-assembled units.

ABB

Shell awarded ABB a USD 180 million EPC contract for the Bonga field's subsea production system. The contract included the delivery of 29 conventional subsea trees and associated hardware to facilitate oil production from, and water injection into, the reservoir.¹¹⁵

Technip

The following projects were undertaken in Nigeria by Technip's affiliate, CresTech:

- Akpo Jumpers project for Delattre Bezons Nigeria: construction of isometrics and stress analysis of jumpers in 2010
- EGP3B Brownfield production platform modifications project for Chevron Nigeria Limited: Detailed Engineering Design (DED) in 2010
- Etim project for Mobil: Life extension Repairs Project (Phase II Review) in 2010.
- Asabo project for Mobil: additional generator project (Follow - on Engineering) in 2009
- Egina FPSO offshore Basic Engineering project for Total Upstream Nigeria: FEED in 2009
- Onshore Aviation Storage facility for Sahara group: Port Harcourt and Abuja for a DED contract in 2009
- Offshore Iyak SA / SB Wellhead Development project for MOBIL: FEED contract in 2008
- INIM As-Built Project for MOBIL in 2008
- Escravos Gas Project (EGP 3B) stages 1, 2, & 3 (upgrading): DED contract on an onshore/offshore site for Chevron in 2008
- OK-LNG for Technip: pre-FEED onshore contract in 2008
- Onshore asset gas management project for Chevron: DED contract in 2008
- Akri-Oguta pipeline Project for NAOC: onshore/offshore FEED contract in 2007 for Nigeria Agip Oil Company

¹¹⁴ "West Africa: EA sees first oil ahead of schedule," Offshore, 2 January 2013. <<http://www.offshore-mag.com/articles/print/volume-63/issue-2/news/special-report/west-africa-ea-sees-first-oil-ahead-of-schedule.html>>.

¹¹⁵ "ABB wins USD 180 million subsea contract off Nigerian coast," ABB, 22 March 2001. <<http://www.abb.com/cawp/seitp202/c1256c290031524bc1256a1700401ed8.aspx>>.

- OK-LNG project for Technip: pre-FEED onshore/offshore contract in 2007
- Ogunu Fuel Depot project for SPDC: DED onshore contract for Shell Producing Development Company in 2007
- Onshore Brass LNG Project for Nigerian Agip Oil Company: FEED contract in 2007
- Swamp facility upgrade Project for Chevron: FEED contract for the south swamp facility upgrade as well as a FEED contract for the North swamp facility in 2007
- Escravos Gas Project for Chevron: In a JV with Technip on an onshore/offshore location. Design contract and a FEED contract in 2007
- Akogen Phase 2/Amp 2 Project for Total: Basic Design contract
- Bosi FPSO offshore Project for Mobil: FEED contract in 2005 for an offshore FPSO
- Dibi / Olero Creek temporary production for Chevron: FEED contract in 2005

Saipem

The operator of the Usan field, Total, awarded a contract to the Italian oil and gas company, Saipem, for the EPC, pre-commissioning and assistance of the subsea umbilicals (72 km), flowlines (61 km) and risers connecting the 42 subsea wells to the FPSO, along with the oil loading terminal, consisting of an offloading buoy and two offloading lines, and part of the FPSO anchoring system. The contract price is over USD 1.3 billion.¹¹⁶

Saipem received a USD 3 billion engineering, procurement, fabrication, installation and pre-commissioning contract for the Egina project in June 2013.¹¹⁷ In the same year, FMC Technologies was awarded a USD 1.2 billion engineering, procurement, construction and commissioning contract in the same year to provide subsea production systems for the project. The new FPSO will have a production capacity of 200 Mbbl/d.

In October 2011, Saipem was awarded the contract to provide EPC of the OFP2 jacket and living quarter platform for Ofon Field phase 2.¹¹⁸

In a JV with Single Buoy Moorings, Saipem was awarded a contract for the development of Okono and Okpoho fields. The contract was worth USD 356 million with Saipem's share at USD 178 million. Two FPSOs were installed with a combined production capacity of 62 Mbbl/d.¹¹⁹

Saipem constructed the Erha FPSO. They contracted Sembawang Shipyard with SOME for the offshore conversion of the FPSO. The contract called for the fabrication, integration, pre-commissioning and commissioning assistance of 11 modules of FPSO topside facilities. The FPSO has a storage capacity of 2.2 MMbbl.¹²⁰

¹¹⁶ "Saipem awarded new Offshore contract in Nigeria worth in excess of USD 1.3 billion," Saipem, 28 March 2008 <<http://www.saipem.com/site/home/press/by-year/articolo5588.html>>.

¹¹⁷ Offshore Technology. Egina Oil Field, Nigeria. <<http://www.offshore-technology.com/projects/egina-field/>>.

¹¹⁸ Offshore Technology, Ofon Field, Oil and Gas Field, Nigeria. <<http://www.offshore-technology.com/projects/ofon-field/>>.

¹¹⁹ "Saipem wins a significant offshore contract in Nigeria," Killajoules, 4 September 2001. <<http://killajoules.wikidot.com/archive:saipem-wins-a-significant-offshore-contract-in-niger>>.

¹²⁰ "Successful completion of Erha FPSO another milestone achievement!" SEMBship, No.34, January 2006. <<http://www.sembschip.com/newsroom/images/2006/ErhaFPSO2006.pdf>>.

Cameron

The Usan field's subsea equipment was provided by Cameron. The US oilfield technology and services company supplied subsea systems engineering and project management along with subsea trees, production and intervention control systems, manifolds, flowline connection systems, installation support and associated spares.¹²¹

Subsea 7

The Addax Okwori and Antan projects were successfully completed offshore in Nigeria by Subsea 7 in 2010. The scope of the two projects included the transportation, installation and testing of flexible flowlines, risers and umbilicals in the Okwori field, and tie-in of rigid spool pieces at Antan.¹²²

Bumi Armada

The Okoro oil field utilizes an FPSO named Armada Perkasa. Bumi Armada converted a tanker built in 1975 to an FPSO at the Keppel Shipyard in Singapore. The FPSO is 211 m in length and 32 m in breadth. It has capacity to process 27 Mbbl/d and store 360 Mbbl of crude oil.¹²³

3.5.3 Midstream

TSKJ consortium

The consortium was composed of KBR, Snamprogetti, Technip and JGC Corporation. They built the LNG plant on Bonny Island. They won four contracts between 1995 and 2004, amounting to approximately USD 7 billion. With the first contract, they beat the rival consortium BCSA, comprised of Bechtel, Chiyoda, Spibat and Ansaldo. They built the first six LNG trains at the plant. However, it has been revealed that a bribe was made in order to secure some of the contracts; over USD 1 billion has been made by the four companies in settlements.¹²⁴ Nonetheless, they were still commissioned to do the FEED for train 7 of the Bonny Island LNG plant.

The consortium (bar Technip) were awarded the EPC contract for the Escravos Gas-to-Liquid Plant.¹²⁵ The EPC contract is valued at USD 1.7 billion.¹²⁶ Acergy secured a USD 500 million contract for gas development plan of the Escravos project in October 2009. The

121 "The ineluctable march of USAN project," Total, 15 February 2010. <http://www.ng.total.com/media/features/0607_15Feb2010_features_1/tup-news_no-30_15Feb2010.pdf>.

122 Subsea 7, Addax Okwori and Antan, 2011. <<http://www.subsea7.com/content/dam/subsea7/documents/whatwedo/projects/africaandgulfofmexico/AddaxOkworiAntan.pdf>>.

123 Bumi Armada, List of FPSO. <http://www.bumiarmada.com/102_119_117/Web/WebPage>List-of-FPSO%20Floating-Production-Storage-Offloading.html>; Offshore Technology, Okoro Oil Field, Nigeria. <<http://www.offshore-technology.com/projects/okorooilfieldnigeria/>>.

124 Foreign Corrupt Practices Act, Keeping FCPA Enforcement Statistics In Perspective, 23 January 2013. <<http://www.fcpaprofessor.com/category/bonny-island-bribery>>.

125 Hydrocarbon Technology. Escravos Gas-to-Liquids Project, Niger Delta, Nigeria, <<http://www.hydrocarbons-technology.com/projects/escravos/>>.

126 "Chevron Nigeria and NNPC Award KBR and Partners EPC Contract for Gas to Liquids Plant in Escravos, Nigeria," KBR, 8 April 2005. <<http://www.kbr.com/newsroom/press-releases/2005/04/08/chevron-nigeria-and-nnpc-award-kbr-and-partners-epc-contract-for-gas-to-liquids-plants-in-escravos-nigeria/>>.

contract includes engineering, fabrication, procurement, transportation, installation, tie-in and commissioning of the plant. It covers the procurement and installation of pipelines of about 130km length and assembly, along with installation of 15 risers.

Daewoo Engineering & Construction

In 2006, the South Korean engineering group Daewoo E&C won a project for an oil and gas facility for the Gbaran-Ubie project located 100 km northwest of Port Harcourt.¹²⁷ SPDC ordered the project, and it was completed by July 2009.

Siemens

Siemens delivered two compressor sets and three gensets, all with its 13-MW SGT-400 gas turbine drivers for the Gbaran-Ubie project.¹²⁸

Repeating an identical order placed in 2002, Siemens won a contract to supply an electric motor driven compressor train to the Bonny Island LNG Plant. Delivered in 2000, the scope of supply was: three compressor trains, each comprising one horizontally split single-shaft compressor STC-SH (10-6-A) and electric motor.¹²⁹ The end-user is Nigeria LNG Ltd. The project consortium includes Technip, Snamprogetti, Kellogg and JGC.

Siemens also supplied the world's largest end-flash gas (EFG) single-shaft compressor for Nigeria LNG, NNPC, and 2 SSC5-2000E plants for the Afam project.¹³⁰ Siemens' SSC5-2000E is a gas turbine capable of burning a range of fuels, including gas and liquid fuels with varying calorific values.¹³¹

3.5.4 Downstream

Siemens

Following the Afam V and Geregu I plants, Geregu II is now the third gas-turbine power plant to be constructed by Siemens in Nigeria as a turnkey project. The scope of delivery supplied for Geregu II included three SGT5-2000E gas turbines, three SGGen5-100A generators, as well as all the electrical systems and the SPPA-T3000 control system. Siemens had also supplied three E-class gas turbines, generators, and the control technology for the Geregu I power plant.¹³²

127 "Daewoo Gets US\$800 million Project from Nigeria," Plant Korea, 13 March 2006. <<http://www.plantkorea.com/en/portal/NewsView.asp?idx=17>>.

128 Siemens, "Venture," No.6, January 2007. <http://www.energy.siemens.com/hq/pool/hq/energy-topics/publications/venture/pdf/Venture_6.pdf>.

129 Siemens, "Optimizing the LNG Value Chain," 2006. <http://www.energy.siemens.com/hq/pool/hq/industries-utilities/oil-gas/applications/lng/optimizing%20the%20LNG%20value%20chain_EN.pdf>.

130 Siemens, 2010 Romania Gas Forum, 2 June 2010. <http://www.petroleumclub.ro/downloads/rgf/13_PeterGrobmueller_Siemens.pdf>.

131 Siemens, Simple Cycle Power Plants. <<http://www.energy.siemens.com/nl/en/fossil-power-generation/power-plants/gas-fired-power-plants/simple-cycle-power-plant-concept/ssc5-2000e.htm#content=References>>.

132 "More power for Nigeria's future: Siemens hands over Geregu II gas-turbine power plant to customer on schedule." Siemens, 4 June 2013. <<http://www.siemens.com/press/en/feature/2013/energy/2013-06-geregu2.php>>.

GE

GE has supplied most of the gas turbines in Nigeria. GE supplied four 126 MW GE Frame 9E Gas Turbines and two 285 MW GE Steam Turbines for the Alaoji power station. At the Olorunsogo II power plant four GE Frame 9E Gas Turbines and two GE Steam Turbines were provided. The Calabar, Sapele II and Ihovbor power plants each have four GE Frame 9E Gas Turbines.¹³³

In 2010, GE announced that the company would provide four gas turbines for the Omotosho Phase 2 Power Plant in Ondo, Nigeria. The scope of supply includes gas turbines, generators, accessories, and technical assistance and training for the EPC contractor for the project, China Machinery & Equipment Company. PHCN owns and operates the new plant, whose capacity is more than 500 MW.¹³⁴

GE built the majority of the gas turbines in Ughelli power plant. Hitachi upgraded the GE units in Delta II and III of the Ughelli plant from 2000 to 2008.¹³⁵

Alstom

In 2012, Alstom was contracted by the Rivers State Government of Nigeria to deliver a GT13E2 gas turbine to the Port Harcourt power plant located in Rivers State, Nigeria. The gas turbine has an output of 182.2 MW. The contract price is approximately USD 54 million.¹³⁶

Rolls Royce

Rolls Royce supplied a 31 MW Rolls Royce RB211 GT for a small scale project in Kolo Creek power station which was installed in early 2008.¹³⁷

Other recent orders in Nigeria for Rolls Royce have included an USD 82 million contract in September 2005 from Technip for six RB211 industrial gas turbines.

Two 40,000 horsepower gas compression packages were ordered as part of the East Area additional oil recovery project. Another power generation package is also being supplied for the second phase of the Amenam platform.

Mitsubishi Heavy Industries (MHI)

MHI, along with Mitsubishi Corporation have been awarded a contract for pre-FEED for the ammonia, urea and petrochemicals plant at Onne, Rivers State. The expected completion date of the project is 2016.¹³⁸

133 Industcards, CCGT Plants in Nigeria, 17 March 2014. <<http://www.industcards.com/cc-nigeria.htm>>.

134 Bowman, A., "Nigeria wins \$1bn General Electric manufacturing investment," Financial Times, 31 January 2013. <<http://blogs.ft.com/beyond-brics/2013/01/31/nigeria-wins-1bn-general-electric-manufacturing-investment/#axzz2ni9sQ1J6>>.

135 Transcorp Ughelli Power, About us. <<http://ughellipower.com/plants-facilities>>.

136 "Nigeria chooses Alstom to equip its Port Harcourt power plant." Alstom, 2 January 2012. <<http://www.alstom.com/press-centre/2010/4/Nigeria-chooses-Alstom-to-equip-its-Port-Harcourt-power-plant-20100415/>>.

137 "RB211 for Nigeria's Kolo Creek," Modern Power Systems, 1 December 2006. <<http://www.modernpowersystems.com/features/featurerb211-for-nigeria-s-kolo-creek/>>.

138 "Mitsubishi, Notore form joint venture for ammonia, urea complex in Nigeria," Hydrocarbon Processing, 24 April 2012. <<http://www.hydrocarbonprocessing.com/Article/3016926/Mitsubishi-Notore>>.

MHI have signed a partnership with JMG, a leader in the power generator industry in Nigeria.¹³⁹ MHI is likely to play an increasing role in supplying power generators and turbines for Nigeria's downstream sector.

3.6 Future opportunities for international suppliers

The key conclusions from the Nigeria country analysis are as follows:

- There are both small and large scale security challenges ranging from pipeline theft to embezzlement and terrorism.
- The privatisation of the electricity sector could remedy Nigeria's power outages and make it easier for businesses to operate, as well as spurring further downstream gas developments.
- The (fiscal) uncertainty of the Petroleum Industry Bill is an obstacle to foreign investors.
- Oil production under JVs has declined whilst increasing under PSCs.
- Oil and gas exploration in Nigeria has declined and incentives are required before activity is likely to rise.
- The majority of future oil and gas projects are deepwater developments.
- Nigeria has had a stable export market for the last decade.
- The flaring costs are significant in Nigeria. Infrastructure developments to use this natural gas are challenging but will pay dividends.
- Nigeria is one of the best positioned countries in Africa to develop their downstream oil and gas sector and tap in to the domestic market because of its GDP and population, both of which are one of the largest on the continent.
- The refineries need maintenance and investment to reach full capacity, while there are also new refineries proposed for construction.
- Nigeria has a high threshold for local content participation in the oil and gas industry.

Compared to other sub-Saharan nations, domestic Nigerian oil and gas companies are starting to become more prominent due to a well-developed oil and gas sector and increasingly demanding local content laws. International suppliers will have to readjust their function to align with the changes in the make-up of the Nigerian oil and gas sector. In the short to mid-term, when contracts are handed to Nigerian companies, they require an association with international companies who are familiar with the finer details of the oil and gas industry. International manufacturers can take a step towards securing a future in Nigeria through partnering with these companies by providing them with expertise, knowledge and skills. Furthermore, indigenous companies need partnerships

form-joint-venture-for-ammonia-urea-complex-in-Nigeria.html>; "Notore set to increase fertiliser production through joint development with Mitsubishi Corporation," Notore, 23 April 2012. <<http://www.notore.com/index.php/article/read/42>>.

139 "JMG partners with Mitsubishi to support power sector privatisation in Nigeria," Presidential Task Force on Power. <http://nigeriapowerreform.org/index.php?option=com_content&view=article&id=1132%3Ajmg-partners-with-mitsubishi-to-support-power-sector-privatisation-in-nigeria&catid=36&Itemid=336>.

with international companies to meet the initial high costs faced in the oil and gas industry. The most recent bidding round of oil concessions set IOCs maximum equity participation at 40 per cent.¹⁴⁰

In the longer term, with future developments of local content law, international suppliers will only be able to meet the requirements and be contracted if they build their own operational and manufacturing facilities in Nigeria to ensure they develop local presence and infrastructure. For example, GE is building a USD 1 billion assembly plant in Calabar. Only by doing so, will international manufacturers be able to compete with local contractors. It is a decision for the long-term but needs to be made expeditiously to fulfil local content law and be invited for auctions in which a high level of local representation is required.

The Nigerian National Petroleum Company has identified an abundance of investment opportunities in upstream operations of the Petroleum industry as categorised below:¹⁴¹

- Surveying and sea bottom survey
- Civil works - mud pit construction, concrete works at rig sites
- Seismic data acquisition and interpretation
- Drilling operations
- Pipelining
- Crude oil transportation and storage
- Exploration (although this needs to be incentivized) and the production of oil and gas products
- Development of local substitutes for items, such as medium pressure valves, pumps, shallow drilling equipment, drilling mud, bits fittings, drilling cement etc.

Investment opportunities in the downstream sector identified by Nigeria National Petroleum Company include:¹⁴²

- Crude oil refineries with efficient export facilities. Opportunities exist for companies with the technology to undertake maintenance of refineries, which are currently under-performing
- Establishment of processing plants and industries for the production of refined mineral oil and petroleum jelly, and grease bituminous based water/damp proof building materials
- Domestic production and marketing of LNG and LPG, in order to reduce the level of gas flared
- Domestic manufacturing of LPG cylinders, valves and regulators, installation of filling plants, retail distribution and development of simple, flexible and less expensive gas

¹⁴⁰ Ashurst, "Nigeria Oil and Gas: Marginal Fields," March 2014. <http://www.ashurst.com/doc.aspx?id_Content=10200>.

¹⁴¹ Nigerian National Petroleum Company, Upstream Opportunities. <<http://www.nnpcgroup.com/NNPCBusiness/BusinessInformation/InvestmentOpportunities/UpstreamOpportunities.aspx>>.

¹⁴² Nigerian National Petroleum Company, Downstream Opportunities. <<http://www.nnpcgroup.com/NNPCBusiness/BusinessInformation/InvestmentOpportunities/DownstreamOpportunities.aspx>>.

burners to encourage the use of gas instead of wood

- The expansion of Bonny Island LNG and the construction of Brass LNG
- Ownership and development of gas-fired power plants in the process of privatisation
- Establishment of chemical industries. For example, distillation units for the production of Naphtha and other special boiling point solvents used in food processing
- Linear Alkyl Benzene, Carbon Black and Polypropylene producing industries
- Development of Phase II (Phase III to commence later) in Nigeria's Petrochemical Programme
- Small-scale production of chemicals and solvents e.g. chlorinated methane, Formaldehyde, Acetylene etc. from natural gas
- Development of chain of manufacturing and maintenance businesses for product transportation, marketing and distribution. For example, lubricating oil reprocessing, LPG bottles and accessories, oil cans re-conditioning.

4. Angola

4.1 Business environment

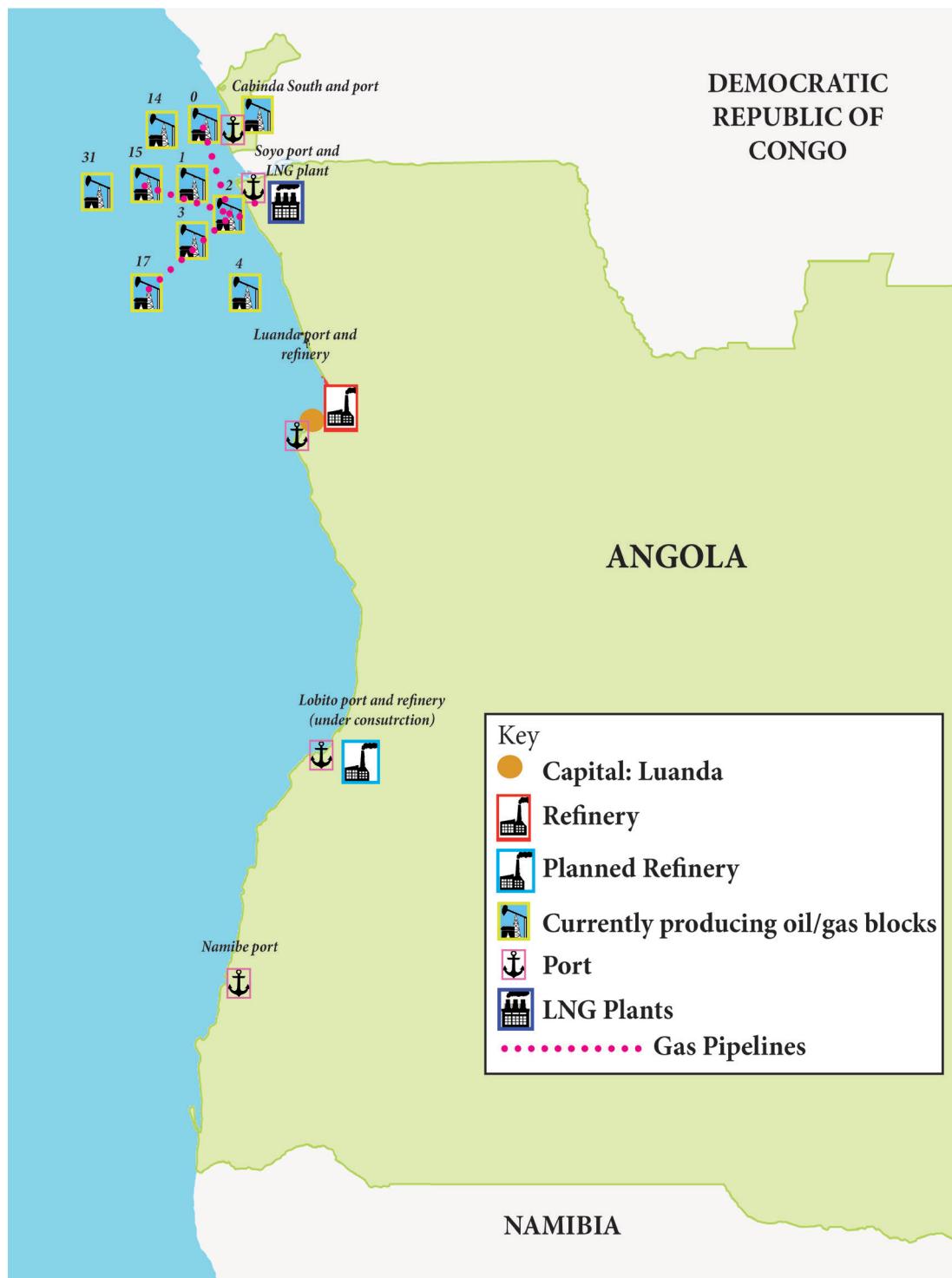
Angola has a relatively small-sized population given the geographical size of the country. The country is recovering from the impact of the 27 year civil war which ended in 2002. Angola is currently the second largest oil producer in sub-Saharan Africa and has been a member of OPEC since 2007. The economy is the fifth largest in Africa and is largely based on the oil and gas industry. Oil and gas resources are located in the west of the country (see Table 4.1 and Figure 4.1).

Table 4.1: Angola facts and figures

Capital	Luanda
Official language	Portuguese
Area	1,246,700 km ²
Population (2014 estimate)	19,088,106
Currency	Kwanza
GDP (PPP) total (2013)	USD 131.8 billion
GDP (PPP) per capita (2013)	USD 6,900
GDP (official exchange rate) total (2013)	USD 124 billion
GDP (official exchange rate) per capita (2013)	USD 6,500
State Corruption Index (2013)	153 (out of 177)
Proven oil reserves (2013)	10.4 billion bbl
Proven natural gas reserves (2013)	12,925 tcf
Total oil production (2013)	1,871.6 Mbbl/d
Total natural gas production (2013)	27 bcf

Sources: United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/ao.html>>; US Energy Information Administration, Angola, February 2014. <<http://www.eia.gov/countries/country-data.cfm?fips=ao>>; Transparency International, "Corruption Perception Index 2013," December 2013. <<http://www.transparency.org/country#AGO>>; OPEC, "OPEC Annual Statistical Bulletin 2013," July 2013. <http://www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB2013.pdf>.

Figure 4.1: Angola's major oil and gas activity and infrastructure



Base map of Angola from FreeVectorMaps.com
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4.1.1 Political stability and security

The political situation in Angola is currently relatively stable but not without potential risks. President Jose dos Santos has ruled since 1979 with his party, the Popular Movement for the Liberation of Angola (MPLA). The Angolan population is composed of 37 per cent Ovimbundu, 25 per cent Kimbundu, 13 per cent Bakongo and the remaining other groups.¹ The main political parties in Angola are ethnically based.² National Union for the Total Independence of Angola (UNITA) represents the Ovimbundu sect of the population, MPLA the Kimbundu and National Liberation Front of Angola (FNLA) the Bakongo. The civil war between MPLA and UNITA caused an estimated 1.5 million deaths.³ Jonas Savimbi, the leader of UNITA, died in 2002, which ended the 27 year war and allowed MPLA to fully take control. The 2012 election, the first under the country's new constitution, contributed to the democratisation process despite a relatively low turnout.⁴

There is speculation that illness may lead President Santos to stand down during this term, which could cause instability if the transition is poorly managed. Due to this possibility, The Economist political risk index for Angola is B.⁵

Cabinda province, where much of Angola's oil is located, is engaged in a long-running independence struggle. The province is rated a High Risk zone by Travel security online.⁶ The separatist terrorist group Front for the Liberation of the Enclave of Cabinda (FLEC) is active in Cabinda and are well known for their attack on the Togo national football team in 2010. Cabinda is separated from Angola by a narrow strip of territory which is part of the Democratic Republic of Congo. Organised demonstrations have been limited and met by a robust security response. At the end of 2012, the Government announced a USD 5 billion sovereign wealth fund to try and tackle economic inequality associated with oil and gas revenue.⁷ The President's son was appointed as the Chairman of the Board of the oil and gas sovereign fund, demonstrating the prevalence of corruption in the political sphere, as Santos and his family will therefore continue to exercise political control even if he is forced to step down by ill health.⁸ In rural areas of Angola, landmines remain from the civil war and pose a serious threat.

Angola's corruption perceptions index is ranked at 153 out of 177 countries in the world, and largely relates to the extractive industries.⁹ The Government introduced reforms,

1 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/ao.html>>.

2 Malaquias, A., "Ethnicity and conflict in Angola: prospects for reconciliation," Institute for Security Studies, 2000. <<http://www.issafrica.org/pubs/books/Angola/6Malaquias.pdf>>.

3 Global Policy Forum, Angola, 14 March 2014. <<http://www.globalpolicy.org/security-council/index-of-countries-on-the-security-council-agenda/angola.html>>.

4 African Economic Outlook, "Angola – African Economic Outlook," 6 September 2013. <<http://www.africaneconomicoutlook.org/fileadmin/uploads/aeo/2013/PDF/Angola%20-%20African%20Economic%20Outlook.pdf>>.

5 The Economist Intelligence Unit, Angola, 13 March 2014. <<http://country.eiu.com/Angola>>.

6 Harvard University, Harvard Travel Assist, Angola, 19 November 2013. <<https://www.internationalsos.com/MasterPortal/default.aspx?content=landing&countryid=78>>.

7 African Economic Outlook, "Angola – African Economic Outlook," 6 September 2013. <<http://www.africaneconomicoutlook.org/fileadmin/uploads/aeo/2013/PDF/Angola%20-%20African%20Economic%20Outlook.pdf>>.

8 Republic of Angola, Fundo Soberano de Angola, 14 March 2014. <<http://www.fundosoberano.ao/language/en/>>; Cabeche, A., "Angola: President's son dips into sovereign fund for 'trophy' Savile Row office," Mail and Guardian, 15 November 2013. <<http://mg.co.za/article/2013-11-14-presidents-son-dips-into-sovereign-fund-for-trophy-savile-row-office>>.

9 Transparency International, "Corruption Perception Index 2013," December 2013. <<http://www.transparency.org/country#NGA>>.

regarding revenue and budget transparency, and called for a crackdown on corruption in 2009. A recent report by the IMF suggests that government funds of as much as USD 32 billion, a quarter of the country's GDP, were missing, which was thought to be linked to the state oil company, Sonangol.¹⁰ Overall, the government initiatives have been insufficient.

4.1.2 Economy

The civil war stunted economic growth and human development in Angola. The population of 18.5 million in 2012 is growing at a high annual rate of 2.78 per cent. Oil exploration and production have increased dramatically in the last 20 years. Recent oil exports and foreign loans have helped to spur economic growth with an annual figure of USD 70.84 billion exports in 2013.¹¹ The current OPEC assigned production quota is 1.65 MMBbl/d. Diamonds also contribute to 5 per cent of exports.¹² In 2013, the GDP at official exchange rates was USD 124 billion and the GDP real growth rate was 5.6 per cent. The GDP at official exchanges rate per capita was high for sub-Saharan Africa at USD 6,500.¹³

Because of dependence upon hydrocarbon resources, Angola's economy is highly vulnerable to the impact of oil price fluctuations in the global market. Despite playing such a crucial role in the economy, the country's oil and gas sector accounts for less than 1 per cent of total employment.¹⁴ Although some progress has been made, much of the oil wealth in the country does not reach the general population.

Angola has significant agriculture potential, yet exploiting this potential is rendered difficult by the pervasiveness of landmines. In 2008, a sovereign wealth fund was created, worth USD 5 billion in assets, which could help Angola to reduce its dependency on oil revenues by increasing investment in other industries.¹⁵

4.1.3 Infrastructure

Angola is ranked bottom in the world for overall infrastructure by the World Economic Forum report 2013-2014.¹⁶ This is attributable to the destruction and lack of development during the civil war. The transportation infrastructure in Angola is extremely poor, and the quality of roads is particularly poor. The ports of Luanda and Lobito allow imports to reach much of the coastal regions but access to interior provinces is limited. The construction of the Benguela railroad should help Angola's agricultural sector, which will connect the border with the Democratic Republic of Congo with the Atlantic Ocean.

The quality of the electricity supply is ranked in the top 10 worst in the world. Despite this, developments are ongoing to improve the power sector. China's Sinohydro completed power plants with a total capacity of 90 MW in January 2013. Angola's largest electrical

10 Human Rights Watch, "Angola: Explain Missing Government Funds," 21 December 2011. <<http://www.hrw.org/news/2011/12/20/angola-explain-missing-government-funds>>.

11 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/ao.html>>.

12 Index Mundi, Angola Economy Profile 2013, 10 December 2014. <http://www.indexmundi.com/angola/economy_profile.html>.

13 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/ao.html>>.

14 African Economic Outlook, "Angola – African Economic Outlook," 6 September 2013. <<http://www.africaneconomicoutlook.org/fileadmin/uploads/aeo/2013/PDF/Angola%20-%20African%20Economic%20Outlook.pdf>>.

15 Ibid.

16 World Economic Forum, "Global Competitiveness Report 2013-2014," 3 September 2013. <http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf>.

project is the Lauca dam due to operate in 2017 and supply electricity to 750,000 people.¹⁷

Internet access is limited in Angola with only 744,000 internet users in 2011.¹⁸ Bandwidth limitations can complicate communications for companies operating in the country. Twelve Angolan companies currently provide internet service, although the advertised bandwidth and the available bandwidth are often divergent. Currently there are no business to business websites available.

Since 2005, through the strength of the oil industry, the Government has used billions of dollars in lines of credit, above all from China, to rebuild Angola's public infrastructure.¹⁹ One such example is the new city Kilamba, which is under construction for half a million people. Angola is one of the few African countries which does not have a significant infrastructure funding gap and, importantly, has the political will to use the money for infrastructure projects.²⁰ However, it will be difficult for the infrastructure development to continue to match the economic development.²¹ The country will face difficulties in extending their infrastructure to sparsely populated rural areas of the country, with a relatively high urban population (59.2 per cent, 2012) and a very high annual rate of urbanisation (3.97 per cent) for the region.²²

4.1.4 Operating in Angola

Angola is ranked 179 out of 189 countries in the world in relation to the ease of doing business compiled by 'Doing Business' in 2013. Angola is therefore one of the most difficult countries in the world in which to conduct business. Figure 4.2 shows key variables in the operation of a business in Angola.

17 Spring, A. and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.

18 US Commercial Service, "Doing Business in Angola," 2012. <http://www.buyusainfo.net/docs/x_7732922.pdf>.

19 Index Mundi, Angola Economy Profile 2013, 10 December 2013. <http://www.indexmundi.com/angola/economy_profile.html>.

20 PWC, "Angola," Africa gearing up, October 2013. <<https://www.pwc.com/gx/en/transportation-logistics/publications/africa-infrastructure-investment/assets/angola.pdf>>.

21 Keeler, Dan, "Country Report: Angola," Global Finance, March 2013. <<http://www.gfmag.com/archives/171-march-2013/12339-country-report-angola.html#axzz2wWLDonPT>>

22 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/ao.html>>.

Figure 4.2: Ease of doing business rankings for Angola

Note: Countries are ranked from 1 to 189, with 1 as the best and 189 as the most difficult.

Source: Original data from Doing Business, "Doing Business 2014. Economy Profile: Angola," 29 October 2013. <<http://www.doingbusiness.org/~media/giawb/doing%20business/documents/profiles/country/AGO.pdf>>.

One of the greatest difficulties for businesses in Angola is enforcing contracts. Data shows that the procedure to resolve a commercial dispute in Angola takes almost four years, costs approximately 44 per cent of the value of the claim and requires on average 46 procedures. Angola has not had any cases involving a judicial reorganization, judicial liquidation or debt enforcement procedure for bankrupt companies in the past five years, so has no record of resolving insolvency.²³

Accessing stable electricity in Angola is difficult, although the Government recently facilitated the ease of the process by eliminating the requirement for customers applying for an electricity connection to obtain authorizations from the two utility companies. In 2010, the World Bank estimated that only 40 per cent of Angolans have access to electricity, leaving approximately 8 million people without access.²⁴ Angola does not have a single national electricity grid, but relies on three independent systems that provide electricity to different parts of the country. The Government hopes to link those three independent grids as part of a national grid system.

In terms of trading across borders, it is expensive for businesses to import to, and export from, Angola. Firms operating in Angola will, on average, pay taxes amounting to 52 per cent of the company's profit. Angola is slightly behind the average ranking for sub-Saharan Africa countries in registering property.

The minimum size requirement to qualify for certain incentives was increased from USD 100,000 to USD 1 million under the private investment law passed in 2011. The incentives

²³ Doing Business, "Doing Business 2014. Economy Profile: Angola," 29 October 2013. <<http://www.doingbusiness.org/~media/giawb/doing%20business/documents/profiles/country/AGO.pdf>>.

²⁴ The World Bank, "World Development Indicators," 18 December 2013. <<http://data.worldbank.org/indicator/EG.ELC.ACCTS.ZS>>

include reparation of funds, tax deductions and exemption from certain taxes and duties. Investors have to enter into a contract with the Angolan state via the National Agency for Private Investment (ANIP). All incentives and benefits for investors are negotiated through ANIP. The Council of Ministers are mandated to review applications within 30 days but in practice this process is subject to substantial delays.²⁵ Further delays are incurred if a company wishes to establish an office in the country, which can be a long and costly process.

Lower levels of economic development and educational infrastructure in Angola relative to the rest of sub-Saharan Africa have had an impact on local capacity, training and expertise. Local recruitment is therefore a challenging process with high local employment thresholds (see Section 4.3.2).

The process for construction permits is much easier. Given the need to rebuild the country and its infrastructure due to the effects of the civil war, procedures for construction are relatively straightforward.

4.2 Resources and infrastructure

4.2.1 Oil

Reserves

Angola currently holds an estimated 10.4 billion bbl of proven crude oil reserves. As shown in Figure 4.3, proven oil reserves have increased dramatically over the last 30 years from below 2 billion bbl in 1983 to approximately 10.4 billion bbl in 2013. Angola has the second largest proven oil reserves in sub-Saharan Africa, and is ranked 18th globally.²⁶ One deepwater block alone (Block 15) is estimated to have recoverable reserves of between 2-2.5 billion bbl of oil. In 1996, the French oil company Elf Petroleum discovered the Girassol oil field in Block 17 in deepwaters (1,300 m), about 140 km off the coast of Angola. The discovery of this substantial oil reserve in such deepwater so far from the coast was unexpected, and as a result approximately 75 per cent of Angola's production now comes from deepwater reservoirs. Exploration has increased substantially over the last decade and is expected to boost proven oil reserves in the coming years.

There is a strong possibility that pre-salt formations will yield valuable oil finds in the next few years. Geological similarities between Angola's pre-salt formations and those found in Brazil have sparked interest amongst investors and IOCs. Pre-salt formations and new projects, such as the Kizomba Satellites should ensure that the Angolan Government reaches its 2 MMbbl/d target by 2014 or 2015.²⁷

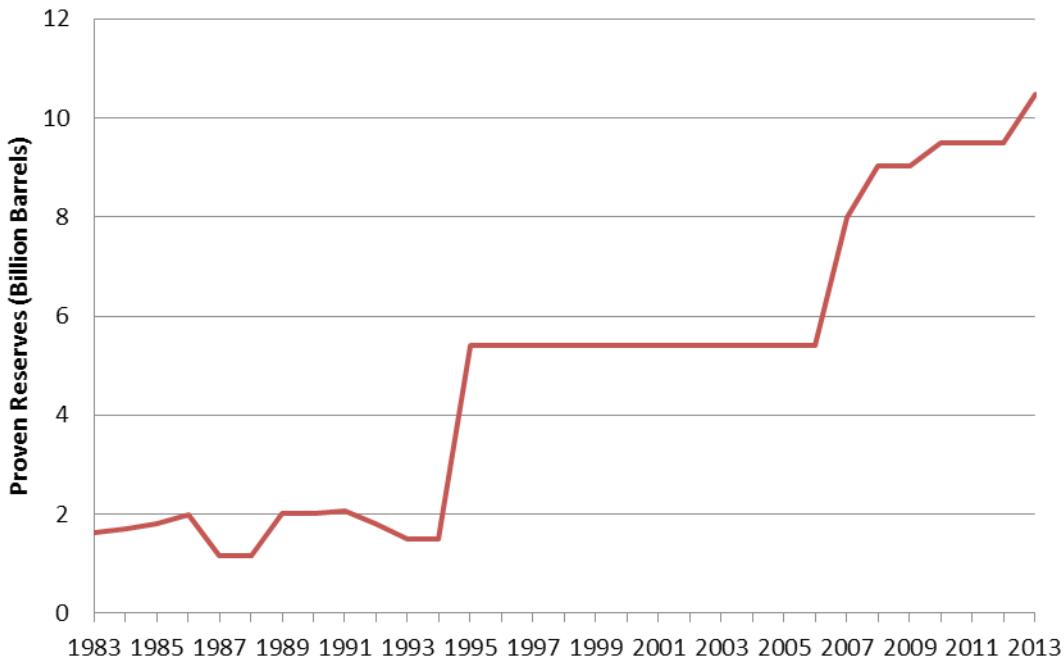
The National Oil Company Sonangol intends to begin onshore exploration – hindered by the civil war previously - in the Cabinda North Block through a subsidiary, Sonangol P&P, which is responsible for all exploration and production activities within Angola. The group were originally to hold a licensing round for onshore blocks in 2013, but this has been delayed until 2014 when it is hoped interested parties will be identified.²⁸

25 US Commercial Service, "Doing Business in Angola," 2012.. <http://www.buyusainfo.net/docs/x_7732922.pdf>.

26 US Energy Information Administration, "Angola Analysis Brief," February 2014. <<http://www.eia.gov/countries/analysisbriefs/Angola/angola.pdf>>.

27 Ibid.

28 Deloitte, Angola 2014 Onshore Bid Rounds, January 2014. <http://www.psg.deloitte.com/NewsLicensingRounds_AO_140106.asp>.

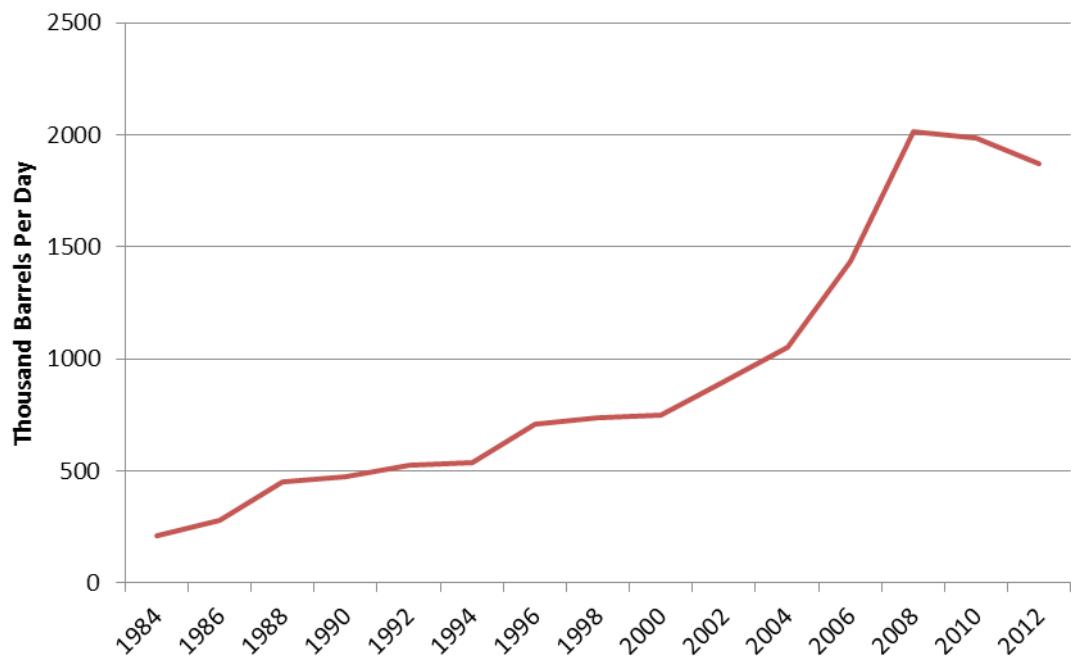
Figure 4.3: Angolan proven crude oil reserves (1983-2013)

Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

Production

Production currently occurs primarily offshore, as oil companies could only operate offshore during the civil war when fruitful discoveries were made. In 2012, Angola produced 1,871.6 Mbbl/d of crude oil (see Figure 4.4), making the country the sixteenth largest producer of crude oil in the world.²⁹ Angola overtook Nigeria as the top oil producer in sub-Saharan Africa in 2009 but the slight decline in the following years, caused by a drop in production of certain blocks as well as scheduled blocks failing to come online, pushed the country back to second place. As a member state, the country's level of production is subject to oversight by OPEC.

29 Ibid.

Figure 4.4: Angolan total oil production (1984-2012)

Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

The majority of Angolan oil has so far come from several key blocks located offshore of the Cabinda Province, Lower Congo Basin and the Kwanza basins. Block 15, the largest producing deepwater block in Angola, accounted for 650 Mbbl/d in 2011 and is expected to produce even more once the Kizomba project has been completed.³⁰ Production gains in many of the currently producing blocks are expected in the next few years.

Some blocks remain problematic. The Lianzi field in the north of Block 14 remains contentious due to its location, spanning the border between the Republic of Congo and Angola, although the field is likely to be less productive than Block 15, with reserves estimated at only 70 MMBbl. A shared production strategy is under development by the Governments of the two countries.

The “common interest zones” in the south of Block 14 between the Democratic Republic of Congo (DRC) and Angola are an even bigger challenge because of the on-going conflict in the DRC and the consequent severely-weakened governance. However, a project to develop an offshore oil block off the coast of the two countries has been agreed upon.³¹

Exports

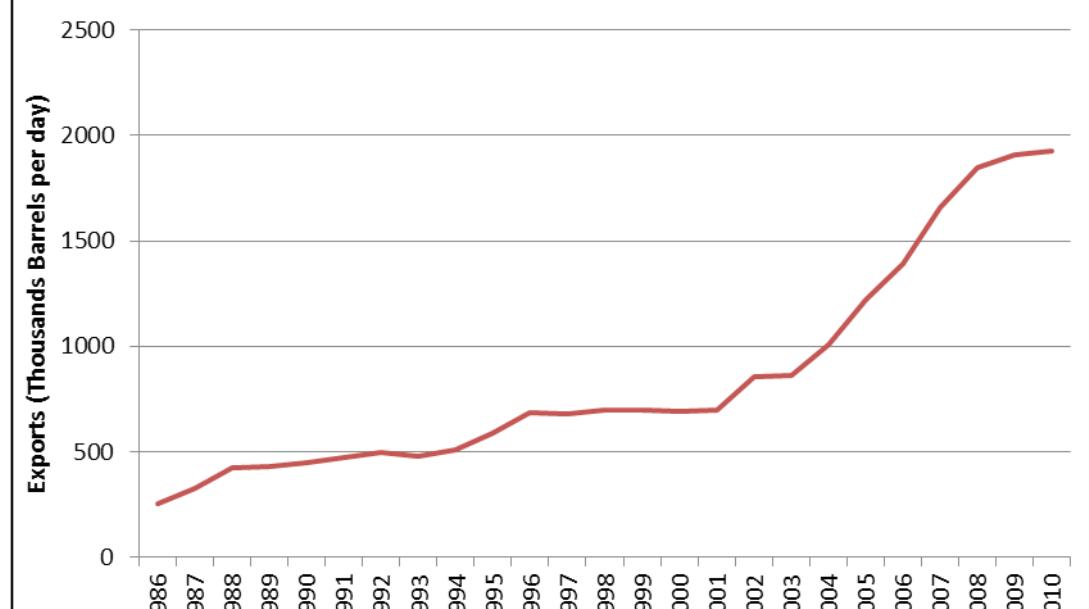
Domestic consumption of oil remains relatively low and the vast majority (80 per cent) of Angola’s oil is exported. Despite this, Angola imports half of the oil domestically consumed.

30 Offshore Technology, Kizomba Offshore Field Deepwater Project, Angola. <<http://www.offshore-technology.com/projects/kizomba/>>.

31 Kavanagh, M., “Sonangol, Cohydro of Congo Reach Agreement on Offshore Oil Block,” Bloomberg, 22 April 2013. <<http://www.bloomberg.com/news/2013-04-22/sonangol-cohydro-of-congo-reach-agreement-on-offshore-oil-block.html>>.

Angolan crude oil is light and sweet, making it ideal for export to major markets, and the state was the eighth largest exporter of oil in the world in 2012.³² Angolan exports of crude oil have increased considerably since the mid-1980s despite the near three decades of domestic conflict which ended in 2002, at which point exports began to soar. In 2010, exports were just under 2 MMbbl/d (see Figure 4.5).

Figure 4.5: Angolan exports of crude oil (1986-2010)

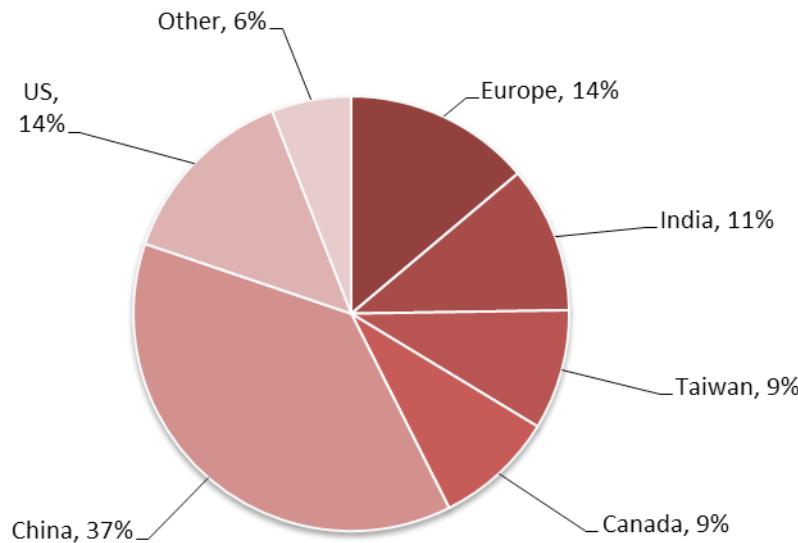


Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

In 2012, oil accounted for an estimated 80 per cent of government revenue, 90 per cent of exports and 47 per cent of the country's GDP.³³ The economy is therefore largely dependent on oil and gas revenues and as such is vulnerable to oil price changes. The bulk of Angolan oil exports go to China, to which 37 per cent of exports went to in 2011. (see Figure 4.6, which represents the most recent export destination data available).

32 US Energy Information Administration, "Angola Analysis Brief," February 2014. <<http://www.eia.gov/countries/analysisbriefs/Angola/angola.pdf>>.

33 African Economic Outlook, "Angola – African Economic Outlook," 6 September 2013. <<http://www.africaneconomicoutlook.org/fileadmin/uploads/aeo/2013/PDF/Angola%20-%20African%20Economic%20Outlook.pdf>>.

Figure 4.6: Angolan oil exports by destination (2011)

Sources: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>; Lloyd's List Intelligence, APEX Trade data. <<http://www.lloydslistintelligence.com/laint/apex.htm?3Bjsessionid=CC4DA5E303F6F3E0B34043E2865FBD78>>.

Angola is China's second largest source of imported oil after Saudi Arabia, and forms a crucial part of China's energy security policy to diversify their supply.

Although Angola exported a significant proportion (14 per cent) of its oil to the United States in 2011, US imports of Angolan crude have been declining over the past decade. As with Nigeria, exports to the US have decreased as a result of increases in domestic production of shale oil in the US. Between 2005 and 2009, Angola exported an average of 480 Mbbl/d to the US, making up 5 per cent of their oil imports. By 2012, this had decreased to 200 Mbbl/d, 3 per cent of the US total oil imports.³⁴

Several Canadian companies have shown interest in the mining sector, infrastructure refurbishment and building and construction sectors in Angola.³⁵ There is high potential for trade and investment in these areas in return for oil exports.

4.2.2 Gas

Reserves

The country possesses considerable natural gas reserves. According to 2013 estimates, Angola has approximately 12.925 tcf of proven natural gas reserves, the second largest

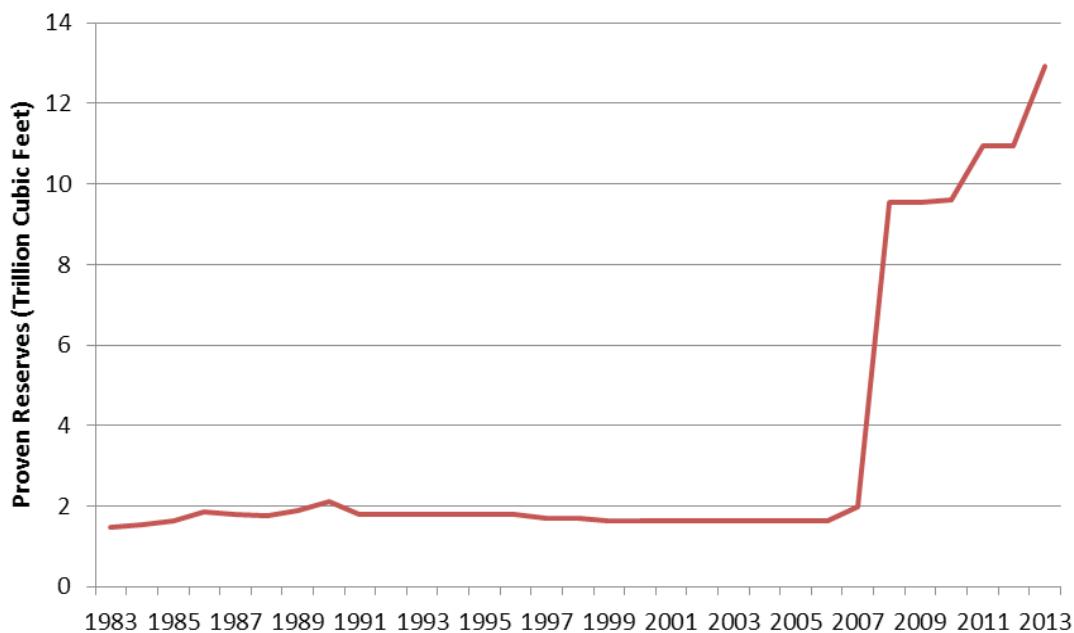
³⁴ US Energy Information Administration, "Angola Analysis Brief," February 2014. <<http://www.eia.gov/countries/analysisbriefs/Angola/angola.pdf>>.

³⁵ Government of Canada, Canada – Angola Relations, 17 January 2014. <http://www.canadainternational.gc.ca/zimbabwe/bilateral_relations_bilaterales/canada_angola.aspx?lang=eng>.

endowment in sub-Saharan Africa after Nigeria (see Figure 4.7).

Sonangol attributes the lack of more accurate knowledge about natural gas reserves to the absence of dedicated investment and of a legal and contractual framework that promotes the exploration and development of natural gas with regard to PSCs.³⁶ It is reported that IOCs cannot market gas under Angola's PSCs.³⁷ Furthermore, the lack of tax incentives in the exploration and production of non-associated gas has resulted in a situation where many wells could have been abandoned by the blocks' contractor groups. If the legal and fiscal situation changes in Angola, the proven reserves could keep rising in Angola as natural gas becomes a more important commodity globally.

Figure 4.7: Angolan proven reserves of natural gas (1983-2013)



Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

Production

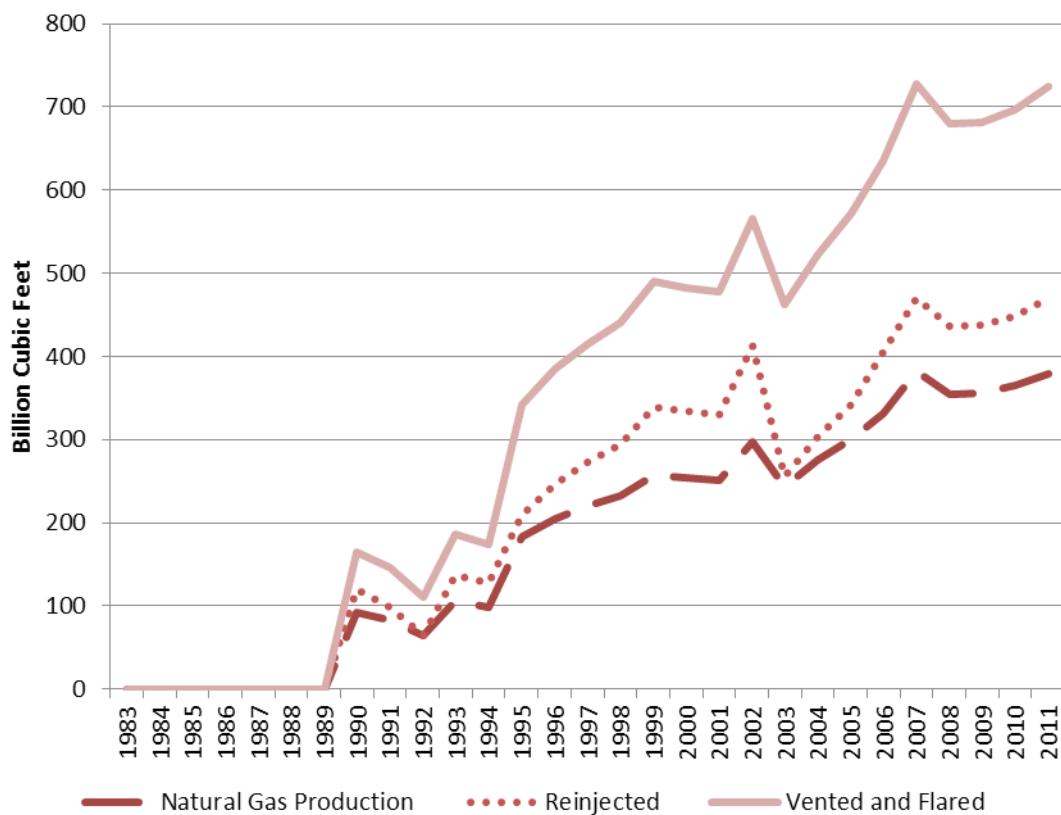
Most of the gas found in Angola is associated gas. The majority of Angolan natural gas is flared off or re-injected into oil fields (see Figure 4.8). Currently, Nema, Lomba and Kuito are the only zero-flare fields.

Angola is behind Nigeria with regard to not prioritising oil production unconditionally over gas production. With the construction of the LNG plant in Soyo, Angola may begin to reshape its policies and incentives to be favourable to the production of gas. The Angola LNG project is supplied by associated gas from five blocks, namely 0, 14, 15, 16 and 17, and it will also develop previously discovered non-associated gas fields in two further blocks, namely 1 and 2 (see Figure 4.1).

36 Sonangol, National Reserves. <http://www.sonagas.co.ao/gasNatural_reservas_en.shtml>.

37 Gismatullin, E., "Cobalt's Lontra Well Finds More Gas in Angola Than Was Expected," Bloomberg, 2 December 2013. <<http://www.bloomberg.com/news/2013-12-02/cobalt-s-lontra-well-finds-more-gas-in-angola-than-was-expected.html>>.

Figure 4.8: Vented and flared gas, re-injected gas and natural gas production in Angola (1983-2011)



Source: US Energy Information Administration, Angola, February 2014. <<http://www.eia.gov/countries/country-data.cfm?fips=AO>>.

Exports

Prior to 2013, Angola was not an exporter of natural gas, all the gas previously produced had been consumed domestically.³⁸ However, the Angolan plan is to use the newly constructed Angola LNG plant in Soya (see Section 4.2.3) to start exploiting Angola's natural gas reserves as an export product. By October 2013, five LNG shipments had been made, to destinations including China and Japan.³⁹

4.2.3 Oil and gas infrastructure

Oil refinery capacity

Angola's current refinery capacity of 40 Mbbl/d comes from just one small refinery in Luanda, built in 1955. This is insufficient to satisfy domestic consumption of petroleum

38 US Energy Information Administration, Angola, February 2014. <<http://www.eia.gov/countries/country-data.cfm?fips=AO>>; United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/ao.html>>.

39 "Angola exports fifth ever LNG cargo, maintenance eyed," Reuters, 15 October 2013. <<http://www.reuters.com/article/2013/10/15/angola-lng-idUSL6N0I52BH20131015>>.

products, even at the relatively low consumption of 94 Mbbl/d recorded in 2012.⁴⁰

Sonaref, the Sonangol subsidiary responsible for running refining operations across the country, hopes to contribute towards meeting domestic demand for refined petroleum products by building a new refinery. The Lobito refinery project, in the Benguela province, stalled for several years due to Sonangol struggling to find an international partner to build the refinery. Construction finally began in 2012, and operations are scheduled to begin in 2017 at an initial production rate of 120 Mbbl/d, with plans to increase the capacity to 200 Mbbl/d in 2018.⁴¹ The complex is designed to process heavy acidic crude oil into high quality fuel.⁴²

Gas processing facilities

The Angola LNG Project in Soyo on the north-western coast of the country was completed in the first half of 2013. Chevron holds the largest share in the plant (36.4 per cent), Sonagas, the subsidiary of Sonangol in charge of up- and midstream gas operations in Angola, has a 22.8 per cent share, and BP, Eni and Total each hold 13.6 per cent. The USD 10 billion project - one of the largest projects on the continent - collects and transports offshore natural gas to a liquefaction plant on the coast.

In June 2013, Chevron announced that its subsidiary, the Cabinda Gulf Oil Company, had confirmed a shipment of the plant's initial production of LNG, which was sent to Brazil.⁴³ Although current production figures are unavailable as of May 2014, the design specifications of the plant indicate that it can process 5.2 million tonnes of LNG per year, producing 63 Mbbl/d of natural gas liquids for export and 125 MMcf/d of natural gas for domestic consumption. The associated gas from Blocks 0, 14, 15, 17, and 18, and the non-associated gas from Blocks 1 and 2, all feed the Angola LNG plant. Gas production from these blocks is transported by gas pipelines to the onshore LNG plant for the separation and processing of natural gas liquids (NGLs) before liquefaction to LNG. There are three loading jetties for different products, which can accommodate ships up to 210m long.⁴⁴ In January 2014, the plant made its first shipment of LPG.⁴⁵

Gas power stations

Angola has three main gas power stations. The first of these is the Luanda OCGT power plant which came into operation in 1972. This has increased capacity from the original design of 24MW to its current capacity of 148 MW.⁴⁶ Futila gas power plant has a capacity of 70 MW with two 35 MW gas turbines. Located in Cabinda, it is operated by Empresa

40 US Energy Information Administration, "Angola Analysis Brief," February 2014. <<http://www.eia.gov/countries/analysisbriefs/Angola/angola.pdf>>.

41 Ibid.

42 Sonangol EP, Sonaref Songol Refinery. <http://www.sonangol.co.uk/wps/portal/!ut/p/c0/04_SB8K8xLLM9MSSzPy8xBz9CP0os3hD15AQUzN_QwMDf38DA09DxyBfbz9_YwsjA_2CbEdFADpxnQ8!!>.

43 McClelland, C. and Carroll, J., "Chevron's \$10 Billion Angola LNG Ships First Gas Cargo." Bloomberg. 2013. <<http://www.bloomberg.com/news/2013-06-16/chevron-led-angola-lng-ships-first-cargo-after-18-month-delay.html>>.

44 "Angola LNG ships first cargo," Angola LNG, 16 June 2013. <<http://www.angolalng.com/Project/AngolaLNGShipsFirstCargo.htm>>.

45 "Angola LNG sells first LPG cargo," Oil & Gas Journal, 30 January 2014. <<http://www.ogj.com/articles/2014/01/angola-lng-sells-first-lpg-cargo.html>>.

46 Global Energy Observatory, "Luanda OCGT Power Plant," <<http://globalenergyobservatory.org/geoid/42580>>.

Nacional de Electricidade and became operational in 2012.⁴⁷ Isloux Corsan, who built the power plant at Futila, has also constructed a 96 MW power plant on floating stabilisers close to Luanda. The floating stabilisers contain two 48 MW open cycle gas turbines, two 11.5 kV generators, two booster transformers (11.5/60 kV), electrical systems and balance of plant systems.

4.2.4 Planned oil and gas projects

Table 4.2 and Table 4.3 detail some of the major oil projects currently taking place or planned for the next few years. Associated gas from several of these projects will also be used to support the growth of the Angolan gas sector. Total's CLOV is expected to be the next major oil project to start production, during the first half of 2014, and is expected to peak at 160 Mbbl/d in 2015. Sonangol hopes that the production from CLOV will help Angola towards its 2015 production target of 2 MMbbl/d.⁴⁸

Many IOCs have also started exploring Angola's pre-salt oil reserves. The US company, Cobalt, has been particularly successful, making discoveries in Blocks 20 and 21. Pre-salt exploration activities are expected to increase through 2014.⁴⁹

Table 4.2: Planned oil and gas projects in Angola

Project	Output (Mbbl/d)	Start of production (actual/predicted)	Block	Operator
CLOV (Cravo, Lirio, Orquidea, Voleta)	160	2014	17	Total
Cabaca Norte-1	40-200	2014	15	ExxonMobil
West Hub Project (Sangos, N'Goma, Cinguvu)	80	2014+	15/06	Eni
Mafumeira Sul	120 (Associated natural gas to Soyo LNG plant)	2015	0	Chevron
Lianzi Field	46	2015	14 deepwater	Chevron
Kizomba Satellites Phase II	125	2016	15 deepwater	ExxonMobil

⁴⁷ Industcards, "CCGT Plants in Africa - other countries," 28 September 2013. <<http://www.industcards.com/cc-africa.htm>>.

⁴⁸ US Energy Information Administration, "Angola Analysis Brief," February 2014. <<http://www.eia.gov/countries/analysisbriefs/Angola/angola.pdf>>.

⁴⁹ Ibid.

Block 31 SE (Palas, Ceres, Juno, Astrea, Hebe, Urano, Titania, Terra, Miranda, Cordelia, Portia)	200+	2016+	31 ultra-deepwater	BP
Negage	75	2016+	14	Chevron
Lucapa	100	2016+	14	Chevron
East Hub Project (Cabaca Norte, SE)	80+	2016+	15/06	Eni
Kaombo Project	200	2017	32 ultra-deepwater	Total

Source: US Energy Information Administration, "Angola Analysis Brief," February 2014. <<http://www.eia.gov/countries/analysisbriefs/Angola/angola.pdf>>.

Table 4.3: Pre-salt exploration activities in Angola

Block	Operators	Partners
6/06	Petrobras	Sonangol P&P, Falcon Oil, Initial
8	Maersk	Sonangol P&P, Svenska Petroleum
9	Cobalt	Sonangol P&P, Nazaki, Alper
19	BP	Sonangol P&P, China Sonangol International
20	Cobalt	Sonangol P&P, BP
21	Cobalt	Sonangol P&P, Nazaki, Alper
22	Repsal	Sonangol P&P, Statoil
23	Maersk	Sonangol P&P, Svenska Petroleum
24	BP	Sonangol P&P
25	Total	Sonangol P&P, Statoil, BP
26	Petrobras	BP
35	ENI	Sonangol P&P, Repsol
36	ConocoPhilips	Sonangol P&P, China Sonangol International
37	ConocoPhilips	Sonangol P&P, Repsol
38	Statoil	Sonangol P&P, China Sonangol International
39	Statoil	Sonangol P&P, Total

40	Total	Sonangol P&P, Statoil
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Source: US Energy Information Administration, "Angola Analysis Brief," February 2014. <<http://www.eia.gov/countries/analysisbriefs/Angola/angola.pdf>>.

Lobito oil refinery

The Lobito oil refinery is due to be operational in 2017. Construction began in 2012. Sonangol expects production of 120 Mbbl/d after phase I, scheduled for the first quarter of 2017. The second phase of operation of the refinery will increase capacity at the refinery to 200 Mbbl/d, and is expected to be in operation in the third quarter of 2018.⁵⁰ The oil will be used for domestic consumption and export.

4.3 Laws and regulations

4.3.1 Policies and governance of oil and gas in Angola

The oil and gas sector in Angola is overseen by the Ministério de Petróleo (MinPet). MinPet sets policies and regulations and oversees the National Oil Company, Sonangol, which is active as an operator (see Section 4.4.2).⁵¹

Sonangol has control over all decisions regarding the allocation and use of oil and gas. The Angolan Government can use its state companies as a means to ensure that control over the industry is retained, and as a way to put pressure on companies to comply with regulations. Sonangol is the sole concessionaire and sole owner of oil rights, and hence has bargaining power with oil companies to push for local content.

Through Sonangol, MinPet is involved in every exploration and production block in the Angolan oil and gas sector. MinPet sets policies and regulations governing, coordinating and supervising the Angolan oil and gas sector. The Angolan regulatory environment is closed, restrictive and prescriptive with a strong emphasis on the role of the state. Table 4.4 details the main laws governing the Angolan oil and gas sector.

50 "Angola Lobito refinery to start Q1 2017," Argus, 19 March 2013. <<http://www.argusmedia.com/pages/NewsBody.aspx?id=839302&menu=yes>>.

51 Ramos, M.L., "Angola's Oil Industry Operations," Open Society Initiative for Southern Africa, October 2012. <http://www.osisa.org/sites/default/files/angola_oil_english_final_less_photos.pdf>.

Table 4.4: Major legislation influencing the Angolan oil and gas sector

Name of Legislation	Year	Description
Petroleum Activities Law (PAL) (Law 10/04)	2004	<p>Under this law, the Government, acting through the MinPet, is responsible for the granting of petroleum exploration and development concessions, and the granting of prospecting licences. This can only be done in association with Sonangol, through a JV, consortium or PSC.</p> <p>It also determines (Article 26.1) that the Government should “guarantee, promote and encourage investment in the petroleum sector by companies held by Angolan citizens and create the conditions necessary for such purpose”.</p>
Law on Taxation of Petroleum Activities (PTL) (Law 13/04)	2004	This law lays out the cost recovery regime and profit share calculation for PSCs and corresponding Concession Decrees.
Petroleum Activities Customs Law (Law 11/04)	2004	This law exempts imports for the training of local staff from customs tariffs. It also lays down regulations prohibiting the bribery of public officials.
Government Decree 48/06	2006	This legislation was in part enacted in order to implement the local content provisions in Article 26 of the Petroleum Activities Law. It regulates the selection of Sonangol's associates in petroleum operations, and the procurement of services and goods for the execution of petroleum operations. Article 16 of the Decree sets out procedures for the procurement of goods and services based on the value of the contract. This decree also sets out the procedure for public tenders of petroleum operations.
Minister of Petroleum Decree 127/03	2003	This ministerial order lays out the General Regulatory Framework on the Contracting of Services and Goods from Angolan Companies by Petroleum Industry Companies (see Section 4.3.2).
Fund for Training and Development of Human Resources (Decree 14/10)	2010	This legislation prescribes a 0.5 per cent training tax, and makes foreign companies' training efforts tax deductible.

Mandatory Hiring and Training of Angolan Citizens (Decree 20/82 and Law 17/09)	1982, amended 1994, revised 2009	This law and its revision mandate that 70 per cent of the workforce of any company active in the Angolan oil and gas sector must be composed of Angolan nationals, and sets out regulations about visas for expatriate workers.
Foreign Exchange Law for the Petroleum Sector ¹ (Law 02/12)	2012	This law requires that foreign companies active in Angola use local banks for all transactions in the country.

Sources: Freshfields, "Angola Oil and Gas," March 2013. <http://www.freshfields.com/uploadedFiles/SiteWide/News_Room/Insight/Africa_ENR/Angola/Angola%20oil%20and%20gas.pdf>; MLGTS Legal Circle, "Doing Business Angola," November 2012. <http://www.mlgts.pt/xms/files/Publicacoes/Guias/DB_Angola_Nov2012_EN.pdf>; Ramos, M.L., "Angola's Oil Industry Operations," Open Society Initiative for Southern Africa, October 2012. <http://www.osisa.org/sites/default/files/angola_oil_english_final_less_photos.pdf>; Local Content Angola, Local content. <<http://localcontentangola.com/local-content>>; Hogan Lovells, "Angola: New foreign exchange regime for the petroleum & gas sector," 2012. <http://www.hoganlovells.com/files/Publication/8422e831-b58c-4da2-8dd1-5f92cade1e1c/Presentation/PublicationAttachment/b0206c86-312d-43ba-86c9-f1acadad6f98/Africa_September_2012_newsletter_Angola_Foreign_Exchange_Regime.pdf>.

4.3.2 Local content law

Decree 127/03

Minister of Petroleum Decree 127/03 was issued on the 25th November 2003, prescribing rules for the procurement of goods and services by all oil companies operating in Angola. Prior to 2003, procurement by oil companies was subject to the rules set out in each oil concession.

The decree divides the business activities conducted by companies in the oil and gas sector in Angola into three categories, governed by the following rules:⁵²

- Angolan Exclusivity. All goods and services that do not require a high level of capital investment or significant specialist expertise must be sourced from Angolan companies, unless the price is more than 10 per cent higher than their foreign competitors.⁵³
- Joint Ventures. All foreign companies involved in supply chain activities which require moderate capital investment and expertise are required to associate with an Angolan JV partner.
- Competition. Tasks requiring high levels of capital investment and significant specialist expertise, such as offshore and onshore production operations, are to be tendered out competitively to private companies, dependent on which company provides the best bid. International companies are encouraged to collaborate with domestic companies.

⁵² Republic of Angola, Decree 127/03, Article 2. <<http://www.revenuewatch.org/sites/default/files/General%20Regulatory%20Framework%20for%20Hiring%20of%20Services%20and%20Goods%20from%20National%20Companies%20by%20Companies%20in%20the%20Oil%20Industry.pdf>>

⁵³ Ibid., Article 6

Angolanization plan

The so-called “Angolanization” policy does not have a specific legal definition, but rather emerges from a variety of local content requirements laid out in Angolan law. It is generally defined as the requirement for Angolan individuals and/or companies to acquire majority shares in companies operating or providing services in the oil and gas sector. There is an obligation for service providers to recruit and train a minimum quota of Angolan citizens, and to provide Angolan citizens with identical employment conditions as expatriates.⁵⁴ International companies are required to meet a 70 per cent Angolanization threshold, although to date this figure has rarely been met.⁵⁵ As well as Decree 127/03, Decree 48/06 also contributes significantly towards the process of Angolanization in the following ways:⁵⁶

- Requirements for public bids in the oil sector are set. This decree states (Article 6, item 5) the definition of an Angolan company, as one in which no less than 51 per cent of the capital is held by Angolan individuals or entities. Article 16, item 9 states that the Supervisory Ministry keeps an updated list of Angolan providers of services and goods to the oil sector, which must be consulted by the operators whenever a public bid is released.
- A special regulation was approved concerning the acquisition of goods and the contracting of services by oil companies. These transactions have to be approved in advance by Sonangol.
- The preference for Angolan companies to provide services to the oil sector was determined. The decree’s determination does not, however, restrict non-Angolan companies from bidding for the same contracts, which will ultimately be reviewed and approved by Sonangol.

IOCs are required to fund training programmes throughout their operations, at a rate of USD 200,000 per block per year during the exploration phase, and then USD 0.15/bbl of oil during the production phase. They are also required to develop Angolanization plans and submit them to MinPet, including personal progression and career development plans for each employee, and their employment strategies for meeting their Angolan workforce targets. Exactly what this process accomplishes is hard to determine, as the reports are generally approved without comment.⁵⁷

4.4 Operators and concessionaires

4.4.1 International oil companies (IOCs)

The IOCs that are operating in Angola are listed, along with their major projects, in Table 4.5. Other IOCs active in Angola not listed in Table 4.5 include: Tullow Oil (UK), INA (Croatia), NIS Naftgas (Serbia), Ajoco (Japan), Svenska (Sweden), Sinopec (China), Maersk Oil (Denmark), Marathon Oil (US) and CNOOC (China).

54 PWC, “Oil and Gas Tax Guide for Africa 2013,” 2013. <http://www.pwc.com/en_TZ/tz/pdf/pwc-oil-and-gas-tax-guide-for-africa-2013.pdf>.

55 US Energy Information Administration, “Angola Analysis Brief,” February 2014. <<http://www.eia.gov/countries/analysisbriefs/Angola/angola.pdf>>.

56 PWC, “Oil and Gas Tax Guide for Africa 2013,” 2013. <http://www.pwc.com/en_TZ/tz/pdf/pwc-oil-and-gas-tax-guide-for-africa-2013.pdf>.

57 Gomes, E. and Weimer, M., “Education in Angola: Partnership Opportunities for the UK,” Chatham House. May 2011 <http://www.chathamhouse.org/sites/default/files/19414_0511pp_gomes_weimer.pdf>.

Table 4.5: Major IOCs active in Angola

Operating company	Project	Remarks
Cabinda Gulf Oil Company (CABGOC)	Block 0 (offshore, Cabinda Province)	CABGOC is a subsidiary of Chevron. CABGOC has an interest in four blocks and 88 per cent of the employees are Angolan.
	Block 14 (offshore, Cabinda Province)	Block 0 is offshore of the Cabinda Province and is composed of 21 fields situated within two areas (A and B). 2011 production was 340 Mbbl/d, approximately 94 per cent of which was crude oil. Block 0 produced its four billionth barrel of crude oil in 2012. Drilling and exploration continues despite some fields experiencing natural decline rates. The Mafumeira Sul field is expected to boost production by 110 Mbbl/d by 2015. Block 0 is operated by a consortium led by a Chevron subsidiary, Cabinda Gulf Oil Company (CABGOC), in partnership with Sonangol, Total and Eni. Chevron holds a 39.3 per cent share in this block.
Esso Exploration Angola Ltd	Block 15 (deepwater)	Block 14 is made of several development areas, currently only a third of these areas are producing. Kuito, a production development, was the first deepwater oilfield and is a zero-flare development. Production in 2012 surpassed 200 Mbbl/d. Chevron (31 per cent) is the chief operator. Stakeholders include Sonangol (20 per cent), Eni (20 per cent), Total (10.1 per cent), Inpex (9.99 per cent) and Petrogal (9 per cent).
		Esso Exploration Angola Ltd has interests in five blocks in Angola and is a subsidiary of ExxonMobil Corporation.
		Block 15 is the largest producing deepwater block in Angola. The Kizomba satellite developments should boost production further. Production for Kizomba A and C was more than 650 Mbbl/d in 2011. It is estimated that between 2 and 2.5 billion bbl of oil can still be recovered from this block. Esso Exploration Angola Limited operates Block 15. BP (26.67 per cent), Eni (20 per cent) and Statoil (13.33 per cent) are all stakeholders.

	Total	<p>Total holds an interest in 10 blocks and is active through 12 subsidiaries in Angola.</p> <p>Block 17's Jasmin, Dalia, Rosa and Pazflor fields continue to boost production. Production in 2011 exceeded 460 Mbbl/d and this figure is expected to rise by 160 Mbbl/d in early 2014. Total holds a 40 per cent stake of the block, ExxonMobil (20 per cent), Statoil (23.33 per cent) and BP (16.67 per cent).</p> <p>Block 32 holds an estimated 1.4 billion bbl. Expected production capacity is over 200 Mbbl/d. Total is the operator (30 per cent), Sonangol P&P (20 per cent), China Sonangol (20 per cent), Esso (15 per cent), Marathon (10 per cent) and Petrogal (5 per cent).</p>
	BP	<p>BP holds interest in nine blocks in Angola. BP has several training and development programmes for local staff, and currently employs 1,000 people permanently based in Angola, of whom 70 per cent are Angolan.</p> <p>Block 18's production was 220 Mbbl/d in 2011. Block 18 includes the Plutonio, Galio, Paladio, Cromio and Cobalto fields.</p> <p>Block 31 was Angola's first ultra-deepwater development, centring on the four fields known as Plutao, Saturno, Venus and Marte (PSVM). Production was set to start in 2012, but was delayed by a year. BP states that production is currently 100 Mbbl/d, and predicts that this block will eventually produce 150 Mbbl/d.</p> <p>BP is the main stakeholder and operator. Other stakeholders are Sonangol (25 per cent), Sonangol P&P (20 per cent), Statoil (13.33 per cent), Marathon (10 per cent) and China Sonangol (5 per cent).</p>

Eni	Block 15/06 (deepwater)	<p>Eni has interests in 10 acreages in Angola, nine of which are offshore. Eni has been present in the country since 1980 with a net production of 102 Mbbl/d barrels per day in 2011.</p> <p>An FPSO for Block 15/06 was contracted to Bumi Armada in 2014 after a string of discoveries in the block. This has made Angola one of the key countries for Eni's growth. Eni is operator of Block 15/06 with 35 per cent. The other partners of the joint venture are SSI Fifteen Limited (25 per cent), Sonangol (15 per cent), Total (15 per cent), Falcon Oil Holding Angola SA (5 per cent) and Statoil Angola Block 15/06 (5 per cent).</p>
Statoil	Block 17	<p>Statoil has operated in Angola for over 20 years and is a partner in eight producing offshore fields, which contributes to 200 Mbbl/d of equity production. They have recently targeted the pre-salt blocks. Production from Block 17 contributes to more than half of Statoil's oil production in Angola.</p>

Source: Chevron, Angola Factsheet, April 2013. <<http://www.chevron.com/documents/pdf/angolafactsheet.pdf>>; ExxonMobil, Company. <http://www.exxonmobil.com/Angola-English/HR/careers_company.aspx>; Total, "Financial Transparency Example of Total in Angola," 2013. <<http://total.com/en/fiche-itie-angola-fr-201207>>; BP, BP in Angola. <<http://www.bp.com/en/global/corporate/about-bp/bp-worldwide/bp-in-angola.html>>; "Eni: New oil discovery offshore Angola," Eni, 15 March 2013. <http://www.eni.com/en_IT/media/press-releases/2013/03/2013-03-15-angola_vandumbu.shtml?shortUrl=yes>; Statoil, Angola, 19 November 2013. <<http://www.statoil.com/en/about/worldwide/angola/pages/default.aspx>>.

4.4.2 National oil companies

Sonangol

Sonangol became the sole concessionaire and majority shareholder in all oil and gas exploration in Angola in 1976. Sonangol is a conglomerate company with activities in upstream, midstream and downstream processes. The company ensures that the state holds significant equity interest in all operations and maintains a monopoly over the downstream sector. It is also involved in a JV with Galp Energia and SonanGalp.⁵⁸ Sonangol Logistics, the transport and logistics division of Sonangol, has expanded into the LNG shipping business, whilst other arms of Sonangol ensure complete control of the downstream industry.

The company has also become increasingly involved in international operations, as it tries to establish itself as a major international player within the oil and gas industry. The group currently has interests in several countries overseas, including Brazil, Cuba, Iraq, Venezuela, and Mexico.⁵⁹

Sonangol has at least 30 subsidiaries and has diversified into other sectors in recent

58 SonanGalp, History. <http://www.sonangalp.co.ao/v1/?page_id=65>.

59 US Energy Information Administration, "Angola Analysis Brief," February 2014. <<http://www.eia.gov/countries/analysisbriefs/Angola/angola.pdf>>.

years. Its primary strategy is to enter into JVs with private oil companies. It receives oil from equity stakes in all production within Angola, but is also an operator in its own right.⁶⁰ The company's revenue in 2011 would have placed it in the Fortune 500, just after Coca Cola, if it were listed.⁶¹ There are many foreign companies involved in Angola, all of which operate under JV and PSCs with Sonangol. Major partners include: Chevron, ExxonMobil, BP, Statoil, Eni, Total, Marathon, SINOPEC and CNOOC.

Somoil

Somoil is an independent, indigenous oil company, based in Luanda. It currently operates the Soyo Onshore Block, in partnership with Chevron and Sonangol.⁶²

Joint ventures (JV) and production sharing contracts (PSC)

The Angolan oil sector is governed by two different types of contractual agreement. The fields developed in the sector's early history, which are largely onshore or in shallow water off of the northern province of Cabinda, are governed by tax and royalty systems in which IOCs work in JVs with Sonangol. Chevron is the most prominent international player operating in the joint venture fields, through its CABGOC subsidiary.

In more recent fields, including the new deepwater blocks that have increased the country's production since 2003, operations are governed by PSCs in which private and public companies split the oil produced to be sold separately. Large international companies such as BP, Chevron, ExxonMobil, Total and Petrobras are among the operators of production sharing blocks.⁶³

4.5 International suppliers

Siemens, GE, Technip, ABB and Daewoo Shipbuilding and Marine Engineering have offices in Luanda in Angola. GE has an Oil & Gas facility in the city and a manufacturing facility in Soyo. Technip has a spoolbase in Dande, and a subsea umbilical plant in Lobito.

4.5.1 Upstream

GE

GE Oil & Gas was awarded a contract to provide Esso Exploration Angola (Block 15), a subsidiary of ExxonMobil Corporation, with subsea production equipment for the deepwater Kizomba Satellites project. In line with the company's localization strategy, a high proportion of equipment will be produced and assembled in Angola, where GE Oil & Gas has significantly invested in a local manufacturing and services facility, a local learning centre, and corporate offices in Luanda.⁶⁴

60 Ibid.

61 Burgis, T., "Sonangol: An economic octopus," Financial Times, 8 July 2012. <<http://www.ft.com/cms/s/0/a0b5777a-c5f5-11e1-b57e-00144feabdc0.html#axzz2ucpdVvof>>.

62 US Energy Information Administration, "Angola Analysis Brief," February 2014. <<http://www.eia.gov/countries/analysisbriefs/Angola/angola.pdf>>.

63 Revenue Watch, Angola Extractive Industries. <<http://www.revenuewatch.org/countries/africa/angola/extractive-industries>>.

64 GE, "GE in East, Central & West Africa," 2009. <http://www.ge.com/eg/docs/1326314435957_1287165190028_GE_ECW_Africa_brochurb.pdf>.

The contract for the supply of production equipment for the Lianzi Field was awarded to GE in October 2012.⁶⁵ GE supplied seven subsea trees, nine subsea control modules, topside and subsea controls distribution equipment and vertical connection systems as part of the USD 165 million deal.

GE supplied four gas turbines for power generation, and five compressors for the FPSO for the CLOV project, at a cost of USD 113 million.⁶⁶

Daewoo Shipbuilding and Marine Engineering

Daewoo Shipbuilding and Marine Engineering built a FPSO for the Pazflor project in Block 17, operated by Total. For USD 2.3 billion, Daewoo Shipping and Marine Engineering agreed in December 2007 to provide engineering, procurement and construction services for the FPSO's moorings, hull and topsides. The FPSO was constructed in Daewoo's shipyard in South Korea, and was shipped to Angola in January 2011. It is capable of processing 200 Mbbl/d of oil and 150 MMcf/d of gas, with a storage capacity of 1.9 MMbbl of crude oil.⁶⁷ The Pazflor FPSO was opened in November 2011, and its service life is 20 years.⁶⁸

The CLOV project, another development in Block 17, also has an FPSO built by Daewoo Shipping and Marine Engineering in a Korean shipyard. The FPSO has capacity to produce 160 Mbbl/d of crude oil and to store 1.7 MMbbl of oil.⁶⁹ Total, the operator of the CLOV project, awarded the contract to Daewoo Shipping and Marine Engineering in 2007, for 2.6 trillion Korean won (USD 2.32 billion).⁷⁰

Daewoo Shipbuilding & Marine Engineering, Hyundai Heavy Industries, and Samsung Heavy Industries, all South Korean contractors, came first on the list for the construction of a new FPSO for Chevron's Block 14, due to be decided in late 2014.⁷¹

FMC Technologies

FMC Technologies supplied three gas-liquid separation systems and 49 subsea trees and wellheads to the project developing the Pazflor field, for approximately USD 980 million.⁷²

For subsea equipment for the CLOV FSOI, Total awarded a contract with the value of approximately USD 520 million to FMC Technologies in 2010. The scope of supply was

65 Offshore Technology, Lianzi Field, Congo. <<http://www.offshore-technology.com/projects/lianzi-oil-field/>>.

66 "GE Oil & Gas Awarded \$113M Contract for CLOV Offshore Angola," Business Wire, 29 October 2010. <<http://www.businesswire.com/news/home/20101029005739/en#.UrXZkPR509Y>>.

67 Ship Technology, Pazflor FPSO Vessel, Angola. <<http://www.ship-technology.com/projects/pazflor-fpsos/>>; Offshore Technology, Pazflor Field Development, Angola. <<http://www.offshore-technology.com/projects/pazflorangola/>>.

68 "The World Largest FPSO 'Pazflor' Opens in Angola," OKPO Gazette, 5 December 2011. <<http://www.dsme.co.kr/2004gazette/pdf/590-1.pdf>>.

69 "CLOV FPSO Leaves South Korea. Sails to Angola," Offshore Energy Today, 9 July 2013. <<http://www.offshoreenergytoday.com/clov-fpsos-leaves-south-korea-sails-to-angola/>>.

70 "Daewoo Shipbuilding completes world's largest FPSO," gCaptain, 13 January 2012. <<http://gcaptain.com/daewoo-shipbuilding-completes/>>.

71 2b1st Consulting, "Chevron evaluates new build against converted FPSO for Angola Lucapa," 25 March 2013. <<http://www.2b1stconsulting.com/us-supermajor-chevron-has-put-out-feelers-in-the-shipbuilding-market-covering-a-potential-newbuild-floating-production-storage-and-offloading-vessel-for-one-of-its-giant-projects/>>.

72 "FMC, Technip, and Acergy to Bring Pazflor to Life for Total," Petroleum Africa, 3 January 2008. <<http://www.petroleum-africa.com/fmc-technip-and-acergy-to-bring-pazflor-to-life-for-total/>>.

the manufacture of 36 subsea trees, wellheads and controls, and the following activities were executed locally in Angola:⁷³

- Fabrication, assembly and testing of 36 wellhead systems and 19 subsea trees
- Manufacture of seven complete manifold systems
- Critical equipment testing, offshore installation support and equipment refurbishment
- Additional recruiting and training of onshore and offshore personnel
- Investment in local facilities.

In January 2011, FMC Technologies was awarded an USD 80 million contract to provide subsea production system for the GirRI (Girassol Resources Initiative) project in Block 17. FMC agreed to supply three subsea production trees, six wellheads and various flowbase and jumper systems under an option three agreement.⁷⁴

Hyundai Heavy Industries

The FPSOs for Kizomba A and B at Block 15 were built by Hyundai Heavy Industries. The contracts were worth USD 800 million and USD 760 million respectively. Hyundai Heavy Industries awarded a contract to AMEC for the design, engineering, and project management services for FPSO Kizomba B.⁷⁵

The bare hull of the Girassol FPSO was built in the Hyundai Heavy Industries shipyard in Korea and moved out of dry dock in July 1999. It can store 2 MMbbl crude oil and support processes with a capacity of 200 Mbbl/d. They were also later contracted to build the deck, which is 180 m long by 60 m wide.

Hyundai Heavy Industries fabricated the FPSO hull and topside equipment of the FPSO for Block 18, at an estimated cost of USD 650 million. BP awarded FMC Kongsberg Subsea a USD 270 million contract to supply subsea systems and related services.⁷⁶

Samsung Heavy Industry

In January 2004, Total commissioned Samsung Heavy Industry to fabricate the FPSO Dalia's hull in South Korea. Construction began that month, and the hull was completed in the following August. The Dalia FPSO for Block 17 measures 300 meters by 60 meters. It processes 240 Mbbl/d and has a storage capacity of 2 MMbbl/d.⁷⁷

Saipem

73 "FMC Technologies Awarded \$520 Million Order for Total's CLOV Development," FMC Technologies, 21 September 2010. <<http://ir.fmctechnologies.com/releasedetail.cfm?ReleaseID=509714>>.

74 Offshore Technology, Girassol FPSO, Luanda, Angola. <<http://www.offshore-technology.com/projects/girassol/>>.

75 "Fluor, AMEC win engineering, project management for Kizomba B FPSO," 2 April 2003. <<http://www.ogj.com/articles/2003/02/fluor-amec-win-engineering-project-management-for-kizomba-b-fpso.html>>.

76 Offshore Technology, Greater Plutonio. Block 18, Angola. <http://www.offshore-technology.com/projects/greater_plutonio/>.

77 Subsea IQ, Dalia. <http://www.subseaiq.com/data/PrintProject.aspx?project_id=248>.

Total awarded Saipem an EPC contract concerning the Girassol and Dalia FPSOs operating in Block 17 offshore Angola. The contract is comprised of the engineering, procurement, fabrication, installation and commissioning of the topside modifications for the multiphase pump systems on board the vessels. The completion of the work is scheduled for 4Q 2014.

The contract to provide and manage the Gimboa FPSO was awarded to Saipem in a six-year USD 570 million contract with a five-year extension option. Delivery to the Gimboa field was concluded in 2008. Saipem converted the oil tanker T/T Magdelaine into the FPSO Gimboa. The FPSO has 1.8 MMbbl of oil storage and a production capacity of 60 Mbbl/d.⁷⁸

Saipem also installed FPSO modules for the Kuito FPSO, which began operations in 2000 and has a production capacity of 100 Mbbl/d.⁷⁹

Bumi Armada

Bumi Armada won its largest FPSO job to date for a deepwater oilfield offshore Angola valued at USD 2.9 billion (RM 9.5 billion). The FPSO's first oil is scheduled for the end of October 2016.⁸⁰

Technip

Technip-Coflexip was awarded two major contracts for the development of the Dalia oil field, offshore Angola by Total. The first contract, valued at approximately USD 640 million, involves the FPSO for which Technip-Coflexip is acting as the leader of a group of engineering and construction companies. Technip-Coflexip's share of the contract is valued at approximately USD 200 million. The second contract, valued at approximately USD 580 million, involves the subsea umbilicals, risers and flowlines package.⁸¹

Total also awarded a contract to a consortium led by Technip with Acergy SA for the development of the Pazflor oil field. The contract requires Technip to provide engineering, procurement, fabrication and installation of production and water injection rigid flowlines, conventional flexible risers and integration production bundle risers, as well as the engineering, procurement and fabrication of over 60 km of umbilical cables. The contract price was approximately USD 1.1 billion.⁸² Technip provided the umbilicals for the CLOV field development too.⁸³

BP awarded a USD 730 million contract for Greater Plutonio field development to a consortium of Stolt Offshore and Technip. The contract covered engineering, procurement,

78 Offshore Technology, Gimboa Field, Angola. <<http://www.offshore-technology.com/projects/gimboa/>>.

79 A Barrel full, Kuito FPSO, 4 February 2014. <<http://abarrelfull.wikidot.com/kuito-fpsos>>.

80 Loh, J., "Bumi Armada bags its biggest FPSO job," The Star, 1 April 2014. <<http://www.thestar.com.my/Business/Business-News/2014/04/01/Bumi-Armada-bags-biggest-FPSO-job-RM95bil-award-puts-it-firmly-in-the-major-league/>>.

81 "Two major contracts for the deepwater Dalia oilfield in Angola," Technip. 6 May 2003. <<http://www.technip.com/en/press/two-major-contracts-deepwater-dalia-oilfield-angola>>.

82 "Technip awarded USD 1.1 billion contract for subsea development in Angola," Technip, 2 January 2008. <<http://www.technip.com/en/press/technip-awarded-usd-11-billion-contract-subsea-development-angola>>.

83 "Technip awarded umbilical contracts in Angola," Technip, 21 January 2011. <<http://www.technip.com/en/press/technip-awarded-umbilical-contracts-angola>>.

fabrication and installation of risers, umbilicals and flowlines to serve all the fields.⁸⁴

Mitsui Engineering & Shipbuilding and IHI

The Sanha LPG FPSO in Block 0 is the largest LPG hull ever built and the first floating production facility built to combine all LPG processing and export functions on board the same unit. The FPSO was built by Mitsui Engineering & Shipbuilding and IHI on behalf of Sonangol/SBM's joint venture.⁸⁵

Keppel

Keppel were awarded contracts to convert vessels into the Mondo and Saxy Batuque FPSOs. Both projects have been completed and the FPSOs are currently operational.⁸⁶

SBM Offshore contracted Keppel to refurbish and upgrade an existing FPSO vessel, FPSO Xikomba. Work on this FPSO unit was expected to be completed by 3Q 2013, but there are no announcements of its completion as of March 2014.⁸⁷

Modec

In July 2008, MODEC was awarded a frame agreement to supply the FPSO for the PSVM project in Block 31. MODEC subcontracted Jurong Shipyard to convert the very large container carrier (VLCC) tanker Ex-Bourgogne to FPSO PSVM. The conversion was completed in April 2010.⁸⁸

Bechtel

Bechtel performed engineering, procurement and construction on the onshore portion of the broad USD 8 billion gas programme at Soyo. This included FPSOs, pipelines to the LNG plant and LNG tankers.⁸⁹

4.5.2 Midstream

According to the US EIA, there is only one oil refinery in Angola. It was constructed in 1955 and is capable of treating only 39 Mbbl/d.⁹⁰ However, it is unclear how Angola will increase its refining capacity in the foreseeable future.⁹¹ Several international suppliers were involved in the construction of the Angola LNG refinery at Soyo, on the Congo Delta.

⁸⁴ Offshore Technology, Greater Plutonio. Block 18, Angola. <http://www.offshore-technology.com/projects/greater_plutonio/>.

⁸⁵ Offshore Technology, Sanha/Bomboco Development, Angola. <<http://www.offshore-technology.com/projects/sanha/>>.

⁸⁶ "Keppel surpasses 11 million safe man-hours on two FPSOs for SBM and ExxonMobil," Keppel, 10 March 2008. <http://www.kepcorp.com/en/news_item.aspx?sid=1693>.

⁸⁷ "Keppel Shipyard secures FPSO contracts from repeat customers worth \$170 million," Keppel, 4 April 2012, <http://www.kepcorp.com/en/news_item.aspx?sid=3286>.

⁸⁸ Offshore Technology, PSVM Development Area, Angola. <http://www.offshore-technology.com/projects/psvm-development-area-angola-africa/>.

⁸⁹ Bechtel, Angola LNG. <<http://www.bechtel.com/angola-lng.html>>.

⁹⁰ US Energy Information Administration, "Angola Analysis Brief." February 2014. <<http://www.eia.gov/countries/analysisbriefs/Angola/angola.pdf>>.

⁹¹ Ibid.

KBR

A Chinese company, Sinopec, planned to build a new refinery in Lobito, but it withdrew from the project in 2007. In 2008, US-based KBR, agreed to provide FEED work for Sonangol's refinery.⁹² In addition to this, Sonangol in 2009 awarded a contract for KBR to provide license and engineering services for grassroots Fluid Catalytic Cracking and Hydroprocessing technologies for the refinery.⁹³

A joint venture composed of KBR, JGC Corporation and Technip was responsible for FEED of the Soyo LNG plant.⁹⁴

Saipem

Saipem constructed five storage tanks at the Soyo LNG plant, of which two are for LNG, one for propane, one for butane, and one for condensate.⁹⁵

Acergy

Angola LNG awarded Acergy a contract for the development of the onshore segment of the pipeline network required for the transportation of gas from Blocks 0, 14, 15, 17 and 18 to the Soyo plant.⁹⁶

Siemens

Siemens supplied and installed eight gas turbines for the LNG power plant.⁹⁷ Siemens have now taken over the supervision of the installation, commissioning and maintenance services to ensure the proper operation of the turbines. The company provided training to Angolan engineers at the Siemens Training Academy in Brazil.⁹⁸

GE

In 2012, GE signed a long-term contractual service agreement to increase overall efficiency of the Soyo plant and provide maximum availability for GE's gas turbine-drive compression trains.⁹⁹

92 "KBR Awarded Lobito Refinery FEED Contract by Sonangol, E.P," KBR, 5 November 2008. <<http://www.kbr.com/newsroom/press-releases/2008/11/05/kbr-awarded-lobito-refinery-feed-contract-by-sonangol-ep/>>.

93 "KBR Awarded FCC and Hydroprocessing Technology Contract for Sonangol, E.P. Refinery," KBR, 19 August 2009. <<http://www.kbr.com/newsroom/press-releases/2009/08/19/kbr-awarded-fcc-and-hydroprocessing-technology-contract-for-sonangol-ep-refinery/>>.

94 "Sonangol, ChevronTexaco and Co-Venturers Award KBR and Partners FEED Contract for Angola LNG Project," KBR, 25 April 2005. <<http://www.kbr.com/newsroom/press-releases/2005/04/25/sonangol-chevrontexaco-and-co-venturers-award-kbr-and-partners-feed-contract-for-angola-lng-project/>>.

95 A Barrel Full, Angola Soyo Lng Terminal. <<http://abarrelfull.wikidot.com/angola-soyo-lng-terminal>>.

96 "Acergy Snags \$250MM Gas Pipeline Gig in Angola," Rigzone, 15 December 2008. <http://www.rigzone.com/news/oil_gas/a/70688/Acergy_Snags_250MM_Gas_Pipeline_Gig_in_Angola>.

97 Siemens, Siemens in Angola, January 2012. <http://www.siemens.co.ao/pool/siemens_in_africa/country_profiles/angola.pdf>.

98 Ibid.

99 "Angola LNG Plant Ensuring Gas Supply through GE Service Agreement," Reuters, 6 June 2012. <<http://uk.reuters.com/article/2012/06/06/idUS26542+06-Jun-2012+BW20120606>>

4.5.3 Downstream

As domestic consumption of oil is relatively low, almost 80 percent of oil produced in Angola is exported. Currently Angola does not have oil or gas export pipelines, but Angola and its neighbouring country Zambia have agreed to build a new 870-mile-long oil pipeline.¹⁰⁰ It is to be built by a Zambian company Basali Ba Liseli Resources.¹⁰¹

Angola has started exporting LNG from the new Angola LNG refinery. The first shipment of LNG from the Soyo plant left for Brazil in June 2013 aboard a vessel operated by Sonangol, the SS Sonangol Sambizanga.¹⁰² The shipment was delayed from the initial schedule by 18 months due to fires, labour shortages and the impacts of US shale drilling.¹⁰³ In January 2014, the plant also made its first shipment of LPG.¹⁰⁴

Mitsubishi Heavy Industries (MHI)

MHI and Toyo Engineering Corporation, Sojitz Corporation, Sumitomo Corporation, entered into an Early Work Agreement covering a portion of the engineering work (plant basic design, preparation of engineering documents and contracts, site surveys, and other work) for an ammonia and urea fertilizer plant.¹⁰⁵ The ammonia and urea fertilizer plant will be constructed in Soyo. Construction, including production and shipping facilities, is scheduled to be completed by the end of 2015. The planned daily production capacity is 2,000 tons of ammonia and 1,750 tons of urea. The plant will utilise excess natural gas supplied to the Soyo LNG plant.

4.6 Future opportunities for international suppliers

The key conclusions from the country analysis are as follows:

- Cabinda, which the oil and gas fields are in close proximity, poses security risks. Onshore production is due to commence in 2015.
- A local contact, or at the very least a Portuguese speaker, is needed to navigate the language and cultural barrier.
- The civil war has led to Angola's infrastructure, human development and education falling behind, making business more difficult.
- There is a high level of exploration activity and deepwater discoveries.
- The pre-salt formations are a promising prospect being explored.

100 US Energy Information Administration, "Angola Analysis Brief," February 2014. <<http://www.eia.gov/countries/analysisbriefs/Angola/angola.pdf>>.

101 Mfula, C., "Zambia firm to build oil pipeline from Angola," Reuters, 12 April 2012. <<http://www.reuters.com/article/2012/04/12/zambia-oil-idAFL6E8FC3T320120412>>.

102 Angola LNG, Angola LNG ships first cargo, 16 June 2013. <<http://www.angolalng.com/Project/AngolaLNGShipsFirstCargo.htm>>.

103 McClelland, C. and Carroll, J., "Chevron's \$10 Billion Angola LNG Ships First Gas Cargo," Bloomberg, 2013. <<http://www.bloomberg.com/news/2013-06-16/chevron-led-angola-lng-ships-first-cargo-after-18-month-delay.html>>.

104 "Angola LNG sells first LPG cargo," Oil & Gas Journal, 30 January 2014. <<http://www.ogj.com/articles/2014/01/angola-lng-sells-first-lpg-cargo.html>>.

105 "Mitsubishi Heavy Industries, Toyo Engineering, Sojitz, Sumitomo Sign Early Work Agreement for Fertilizer Plant in Angola," Sumitomo Corporation, 15 November 2011. <<http://www.sumitomocorp.co.jp/english/news/detail/id=25709>>.

- A licensing round will take place in 2014 (and 2015).
- There are a few contentious oil blocks placed on international borders although agreements seem to have been reached.
- New legislation is needed on PSCs and tax incentives for gas production to encourage international investment.
- The downstream oil and gas sector is undeveloped and there are not many planned downstream oil and gas projects. The Government is likely to prioritise other infrastructure developments, such as the unification of the electrical grid.
- Angola has specific, simple, transparent local content laws.

The oil and gas sector in Angola is competitive and well developed. However, there remain a range of opportunities within the supply chain. Key opportunities identified by UK Trade and Investment and our suggestions include:¹⁰⁶

- Staff provisions such as catering, health and safety provision, and specific training courses
- Seismic data acquisition and interpretation in the pre-salt formations
- A range of equipment, notably for subsea exploration, and ensuing production
- Deepwater pipelining
- Generation infrastructure based on water resources and natural gas
- The construction of the Lobito refinery
- Export facilities and transportation for LNG and LPG exports
- Development of related downstream facilities, such as chemical and fertilizer plants, close to the Soyo LNG plant
- Infusion of private capital and know how to build and operate the energy sector, including oil and gas.

In the past year there have been several established Angolan companies with credible projects seeking out potential partners to provide a range of services to the oil and gas sector, including oil waste management projects. Local partnership projects represent considerable opportunities in Angola for investors and companies.

¹⁰⁶ UK Trade and Investment, Energy sector in Angola, 15 July 2012. <http://www.ukti.gov.uk/pt_pt/export/countries/africa/southernAfrica/angola/sectorbriefing/546840.html?null>.

5. Equatorial Guinea

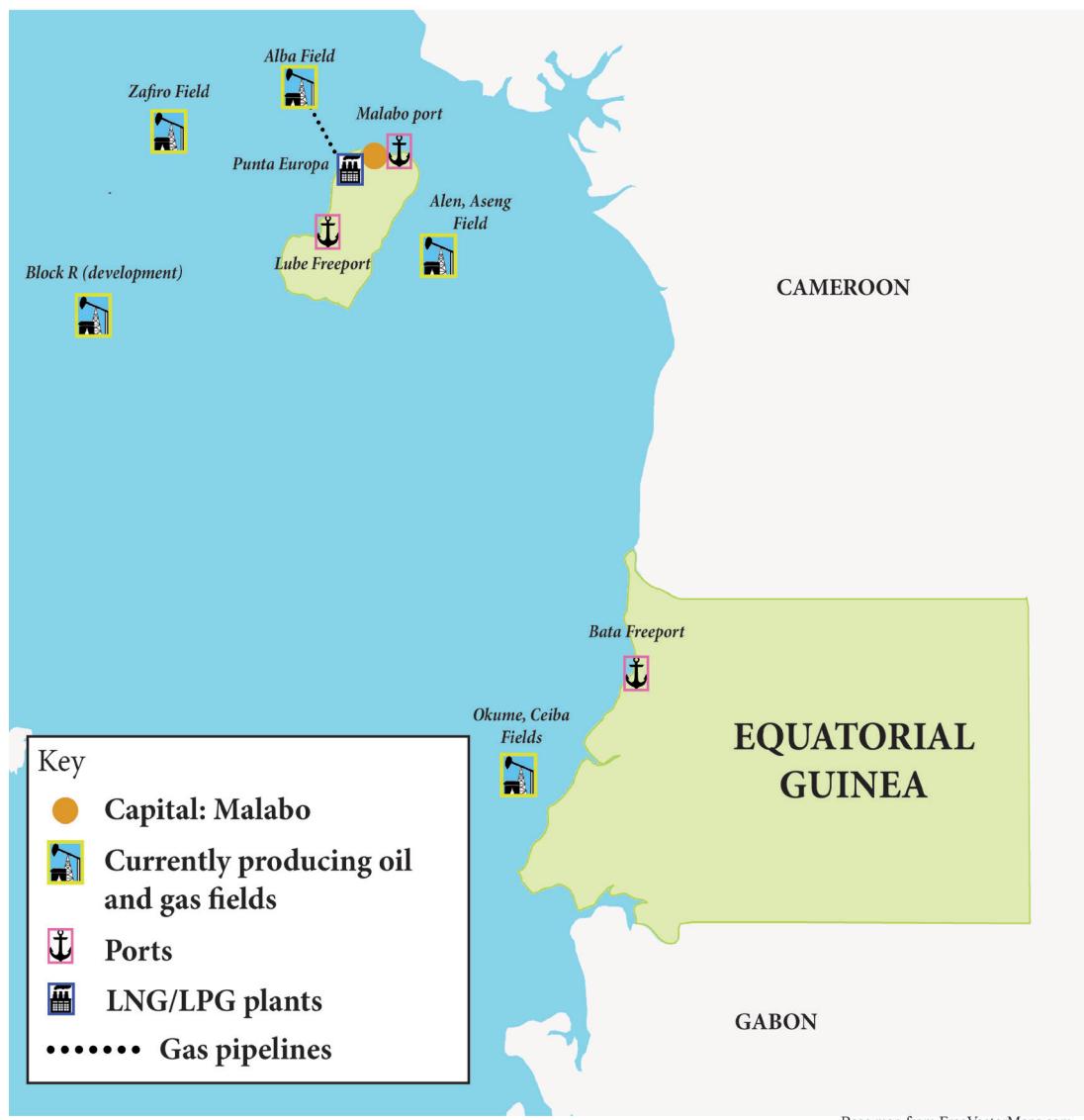
5.1 Business environment

Equatorial Guinea is now the third largest producer of crude oil in sub-Saharan Africa, after Nigeria and Angola, and its economy is largely dependent upon that industry. Since the discovery of the Zafiro field in 1995, oil and gas production in Equatorial Guinea has increased more than tenfold, and oil has quickly become the country's most important export commodity (see Table 5.1 and Figure 5.1).

Table 5.1: Equatorial Guinea facts and figures

Capital	Malabo
Official language	Spanish
Area	28,051 km ²
Population (2013 estimate)	704,001
Currency	Central African Franc
GDP (PPP) total (2013)	USD 19.68 billion
GDP (PPP) per capita (2013)	USD 25,700
GDP (official exchange rate) total (2013)	USD 17.08 billion
GDP (official exchange rate) per capita (2013)	USD 23,700
State Corruption Index (2013)	163 (out of 177)
Proven oil reserves (2013)	1.1 billion bbl
Proven natural gas reserves (2013)	1.3 tcf
Total oil production (2013)	289.4 Mbbl/d
Total natural gas production (2013)	242.97 bcf

Sources: United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/ek.html>>; US Energy Information Administration, Equatorial Guinea, August 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=EK>>; Transparency International, "Corruption Perception Index 2013," December 2013. <<http://www.transparency.org/country#GNQ>>; OPEC, "OPEC Annual Statistical Bulletin 2013," July 2013. <http://www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB2013.pdf>.

Figure 5.1: Equatorial Guinea's major oil and gas activity and infrastructure

5.1.1 Political stability and security

President Teodoro Obiang Nguema Mbasogo has ruled the country since 1979 when he seized power in a coup. Although Equatorial Guinea is nominally a constitutional democracy, the country has yet to hold credible elections and cannot be considered an electoral democracy.¹ The Democratic Party of Equatorial Guinea (PDGE) maintains a monopoly over the country's politics. The constitution was changed in November 2011 to only allow a president two terms in office. However, Obiang's son Teodoro Nguema Obiang Mangue was appointed as Vice-President by his father in 2012, making him second in line for the presidency. The President also has close relatives who have powerful positions in the security forces. The main risk to political stability is the possibility that the President is removed from power through illness or a coup. The Economist political risk index rates Equatorial Guinea as CC because of this possibility.²

The President belongs to the Fang group who compose 85.7 per cent of the population. A third of the population fled between 1968 and 1979, largely due to the genocide against the Bubi ethnic minority. However, Equatorial Guinea is deemed now to be a Low Risk Zone by Travel security online, although the quality of life remains low.³ Bioko Island is closer to the locus of piracy attacks in the Gulf of Guinea compared to the mainland. Because of this, caution should be exercised in oil and gas operations further north as the risks of piracy increase.

Equatorial Guinea is ranked 163 out of 177 countries according to the corruption perception index.⁴ Transparency International has placed Equatorial Guinea in the top 12 most corrupt states in the world. The President has long held that oil revenues are a state secret. In 2008, Equatorial Guinea was a candidate for the Extractive Industries Transparency Initiative (EITI) membership but failed to qualify by the April 2010 deadline and is still not an EITI compliant country. In June 2012, Equatorial Guinea's Department of Justice filed a complaint against the President claiming that he spent USD 315 million on property and luxury goods.⁵

5.1.2 Economy

Equatorial Guinea has a small-sized population with over 700,000 citizens. The country's economy is largely dependent on the oil industry, which fuelled Equatorial Guinea's average annual GDP growth of 26.2 per cent between 2001 and 2005. Equatorial Guinea has total proven oil reserves of 1.1 billion barrels.⁶ The growth of the economy has slowed down and was minus 1.5 per cent in 2013.⁷ It is estimated that the oil and gas sector contributed 78 per cent of the total GDP of Equatorial Guinea in 2012.⁸ The US

1 United States, Department of State, Press statement, 3 June 2013. <<http://www.state.gov/r/pa/prs/ps/2013/06/210215.htm>>

2 The Economist Intelligence Unit, Equatorial Guinea, 13 March 2014. <<http://country.eiu.com/Equatorial%20Guinea>>.

3 Harvard University, Harvard Travel Assist, Equatorial Guinea, 19 November 2013. <<http://www.internationalsos.com/MasterPortal/default.aspx?content=landing&countryid=130>>

4 Transparency International, "Corruption Perception Index 2013," December 2013. <<http://www.transparency.org/country#GNQ>>.

5 Spring, A., and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.

6 US Energy Information Administration, Equatorial Guinea, August 2013. <<http://www.eia.gov/countries/cab.cfm?fips=ek>>.

7 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/ek.html>>.

8 African Economic Outlook, "Equatorial Guinea. Full Country Notes," 2012. <<http://www.africaneconomicoutlook.org/fileadmin/uploads/aeo/PDF/Equatorial%20Guinea%20Full%20>>

has invested over USD 12 billion in the country and is the largest bilateral investor in the country. Exports to the US exceeded USD 1.7 billion in 2012. The US exported mainly industrial products worth USD 233 million to Equatorial Guinea in 2012.⁹ The oil and gas sector accounted for close to 100 per cent of total exports and 90 per cent of budgetary revenue in 2011.¹⁰

The GDP at official exchange rates was USD 17.08 billion in 2013. The per capita GDP was the second highest in Africa, after Seychelles, at USD 23,700. However, this figure is misleading as the lives of the majority of the population have not improved significantly. Poverty is rife, over 60 per cent of the population survive on less than USD 1 a day.¹¹ Equatorial Guinea is ranked 136 out of 186 in the world in 2013 Human Development Index, which underlines the fact that the country's wealth has been concentrated within the political elite.¹²

5.1.3 Infrastructure

The economic growth due to oil reserves did lead to the improvement of the infrastructure in Equatorial Guinea, such as schools, hospitals, roads and social housing. The urban population is low for sub-Saharan Africa at 40 per cent in 2011 and the annual rate of urbanisation stood at 3.16 per cent from 2010 to 2015.¹³ The Government is building a new capital on the mainland in Oyala and it plans to move there within 10 years. However, the main reason for the construction of the new city is said to be for the protection of the president which will be secured by its remoteness.¹⁴ In 2012, several road and bridge projects and the extension of Beta Port were completed.

There is limited access to drinking water, sewage and electricity in the country.¹⁵ Equatorial Guinea does not have an infrastructure ranking in the World Economic Forum report 2013-2014. In 2012, the Dijiploho Hydropower Station was completed with a capacity of 120 MW, together with the Malabo 66 kV power grid. China's state-owned Sinochem Group signed an agreement to fund infrastructure projects to electrify cities and develop an industrial port in exchange for 11,000 barrels a day of crude oil.¹⁶ Equatorial Guinea's 2020 Horizon plan provides the long-term plan to improve the country's infrastructure.¹⁷

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- PDF%20Country%20Note.pdf>.
- 9 United States, Office of the United States Trade Representative, Equatorial Guinea. <<http://www.ustr.gov/countries-regions/africa/central-africa/equatorial-guinea>>.
 - 10 African Development Bank, "Republic of Equatorial Guinea, Country Strategy 2013-2017," 2013. <http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Equatorial_Guinea_-_2013-2017_Country_Strategy_Paper.pdf>.
 - 11 The Open Society Institute, "Corruption and Its Consequences in Equatorial Guinea," March 2010. <<http://www.opensocietyfoundations.org/sites/default/files/equatorial-guinea-20100317.pdf>>.
 - 12 United Nations, "Human Development Report 2013," 14 March 2013. <<http://hdr.undp.org/sites/default/files/Country-Profiles/GNQ.pdf>>.
 - 13 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/ek.html>>.
 - 14 Sackur, S., "Equatorial Guinea: Obiang's future capital, Oyala," BBC News, 17 December 2012. <<http://www.bbc.co.uk/news/magazine-20731448>>.
 - 15 African Economic Outlook, "Equatorial Guinea – African Economic Outlook," 6 September 2013. <<http://www.africaneconomicoutlook.org/en/countries/central-africa/equatorial-guinea/>>.
 - 16 Spring, A. and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.
 - 17 Republic of Equatorial Guinea, "Equatorial Guinea: The Future Vision," May-June 2011. <<http://www.foreignaffairs.com/files/attachments/EG-report.pdf>>.

5.1.4 Operating in Equatorial Guinea

Equatorial Guinea is a difficult country to conduct business in and is ranked 166 out of 189 countries in the world in relation to the ease of doing business in (see Figure 5.2).

Figure 5.2: Ease of doing business rankings for Equatorial Guinea



Note: Countries are ranked from 1 to 189, with 1 as the best and 189 as the most difficult.

Source: Original data from Doing Business, "Doing Business 2014. Economy Profile: Equatorial Guinea," 29 October 2014. <<http://www.doingbusiness.org/~media/giawb/doing%20business/documents/profiles/country/GNQ.pdf>>.

The cost and time involved in starting a business in Equatorial Guinea is close to double the regional average for sub-Saharan Africa. Filing, preparing and paying taxes requires 280 hours a year on average but the amount of tax which has to be paid is over 50 per cent. This high tax rate conversely results in a high level of tax evasion.

With regard to importing and exporting, Equatorial Guinea is above the average ranking for sub-Saharan Africa, although its global ranking is low. Electricity supplies are easily available for businesses relative to the surrounding countries. The country's main national grid is unreliable. Many parts of the country rely on independent local generators for electricity. Companies in the oil and gas sector have built their own power facilities to support their operations.¹⁸

A notable feature of the process of resolving commercial disputes in Equatorial Guinea is the low cost at an average of 19 per cent of the value of the claim. Because of this, Equatorial Guinea ranks highly for being able to enforce contracts.

18 US Energy Information Administration, Equatorial Guinea, August 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=EK>>.

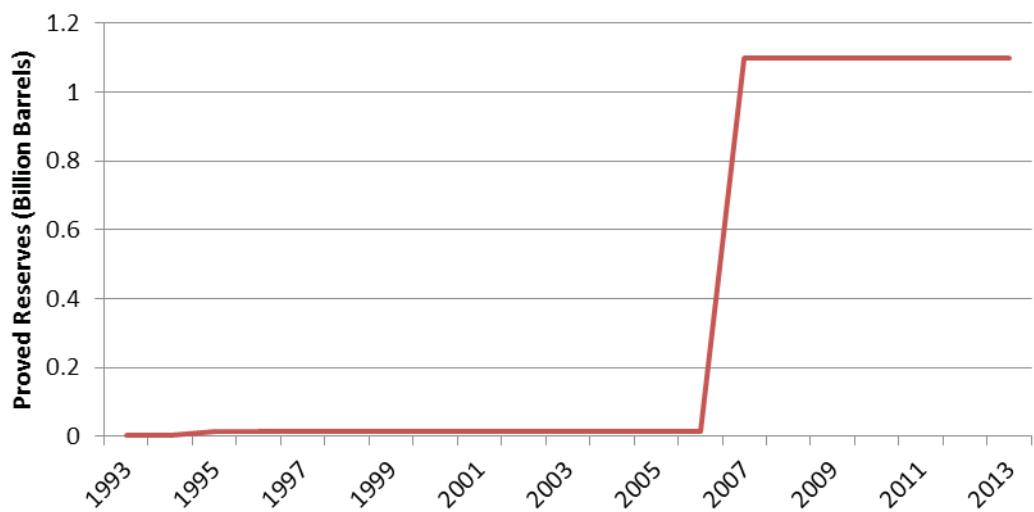
5.2 Resources and infrastructure

5.2.1 Oil

Reserves

Equatorial Guinea has proven oil reserves of 1.1 billion bbl, as of 2013, making the country the eighth largest reserve holder in sub-Saharan Africa.¹⁹ After exploration activity and analysis, proven reserves increased dramatically between 2006 and 2007, from 0.012 billion bbl to 1.1 billion bbl (see Figure 5.3). Exploration activity is on-going, such as in Block A12 close to the Alba field, but there has been no increase in proven oil reserves since 2007.

Figure 5.3: Equatorial Guinea proven oil reserves (1993-2013)



Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

Production

The main producing fields are the Zafiro, Ceiba and Okoumé fields. Since the Zafiro field was discovered in 1995, Equatorial Guinea's oil production has increased considerably (see Figure 5.4). In 1995, the nation's total oil production was 5 Mbbl/d. Ten years later in 2005 it peaked at 375.5 Mbbl/d. At its peak of production in 2004, approximately 65 per cent of the country's total output came from the Zafiro Field.²⁰ Oil production decreased between 2005 and 2011, when it reached a low of 298.9 Mbbl/d.²¹ Oil production decreased because of the maturity of six of the country's fields (Zafiro, Okoumé, Alba,

19 US Energy Information Administration, Equatorial Guinea, August 2013. <<http://www.eia.gov/countries/cab.cfm?fips=ek>>.

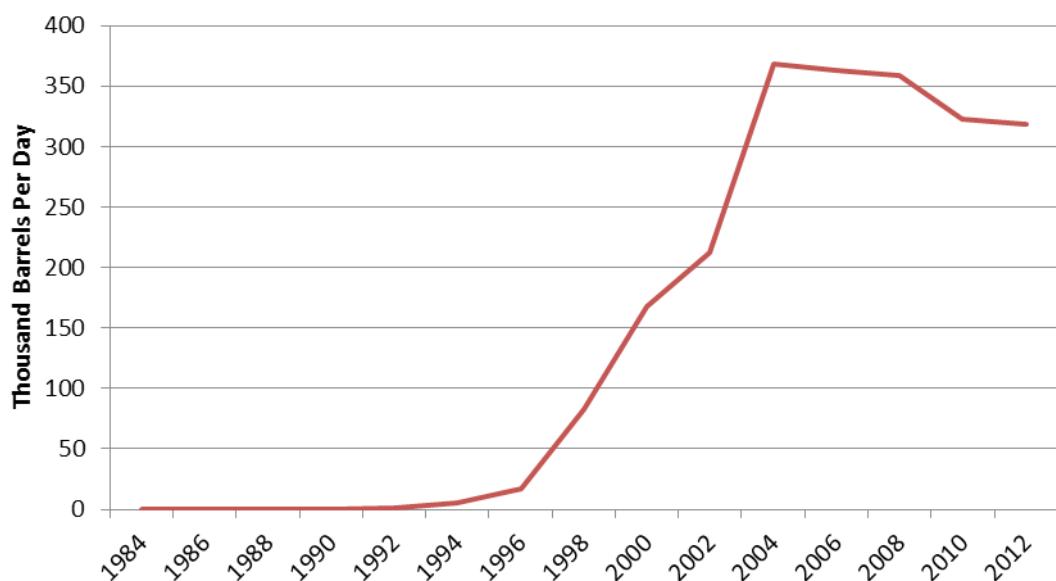
20 US Energy Information Administration, "Equatorial Guinea Country Analysis," February 2012. <http://www.eia.gov/countries/analysisbriefs/cabs/Equatorial_Guinea/pdf.pdf>.

21 US Energy Information Administration, Equatorial Guinea oil production statistics, 1993-2012, August 2013. <<http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=5&pid=55&aid=1&cid=EK,&syid=1993&eyid=2013&unit=TBD>>.

Ceiba, Jade and Serpentina).

The country's declining oil output reversed in 2012 with an increase to 310.4 Mbbl/d, due to new production from the Aseng field, which came on-stream at the end of 2011. The Aseng (formerly known as Benita) field is located in Block 1 offshore of Bioko Island. The field's production rapidly reached 50 Mbbl/d after four sub-sea wells began operation, and production plateaued at 60 Mbbl/d in March 2012.²² The field's operator, Noble Energy, estimates a recovery of 120 MMbbl of liquids over the project's lifetime.²³ It will be a battle to keep production levels high given the maturity of the biggest fields.

Figure 5.4: Equatorial Guinea total oil production (1984-2012)



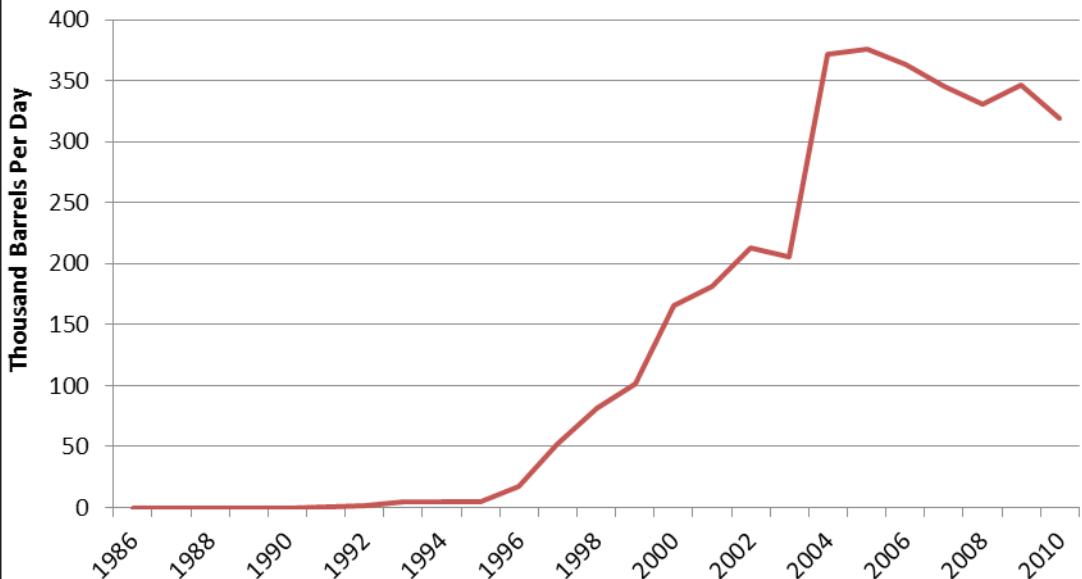
Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

Exports

Exports have generally decreased in line with production since Zafiro peaked in 2004 (see Figure 5.5), US EIA data currently only extends to 2010, and it may be that the recent increase in production will also have led to increased exports.

22 "Aseng oil field production builds to peak," Offshore, 3 September 2013. <<http://www.offshore-mag.com/articles/2012/03/aseng-oil-field-production.html>>.

23 US Energy Information Administration, "Equatorial Guinea Country Analysis," February 2012, <http://www.eia.gov/countries/analysisbriefs/cabs/Equatorial_Guinea/pdf.pdf>.

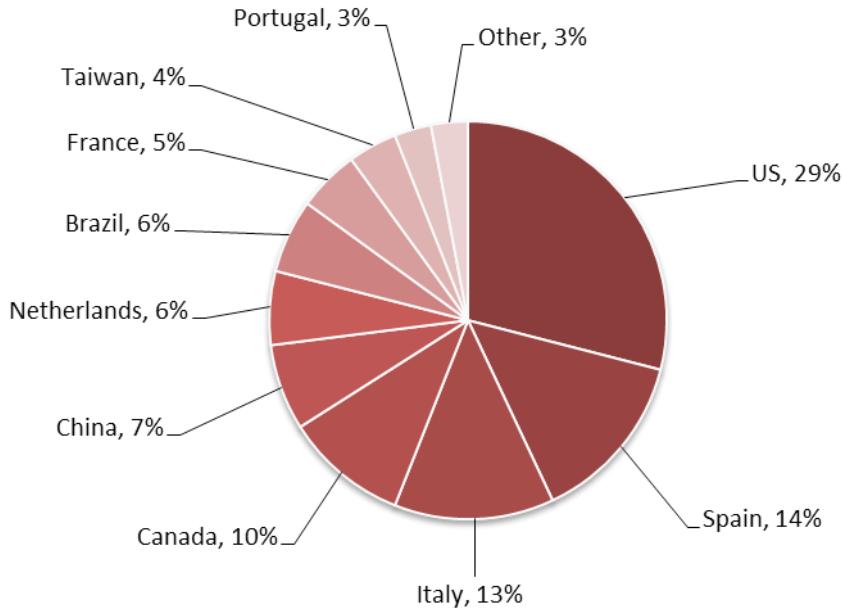
Figure 5.5: Equatorial Guinea exports of crude oil (1986-2010)

Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

Equatorial Guinea exports the bulk of its oil to the US and Europe, the former has strong bilateral trade links with Equatorial Guinea (see Figure 5.6).²⁴ India's Ministry of External Affairs have not expressed a strong intention to increase oil imports from Equatorial Guinea, as they have done with Nigeria and Angola.²⁵ Equatorial Guinea has been approaching Chinese companies regarding infrastructure projects, which could lead to an increase in oil exports to China in return.

²⁴ Ibid.

²⁵ Republic of India, Ministry of External Affairs, India-Equatorial Guinea Relations, July 2013. <http://www.mea.gov.in/Portal/ForeignRelation/India-Equatorial_Guinea_Relations.pdf>.

Figure 5.6: Equatorial Guinea crude oil exports by destination (2010)

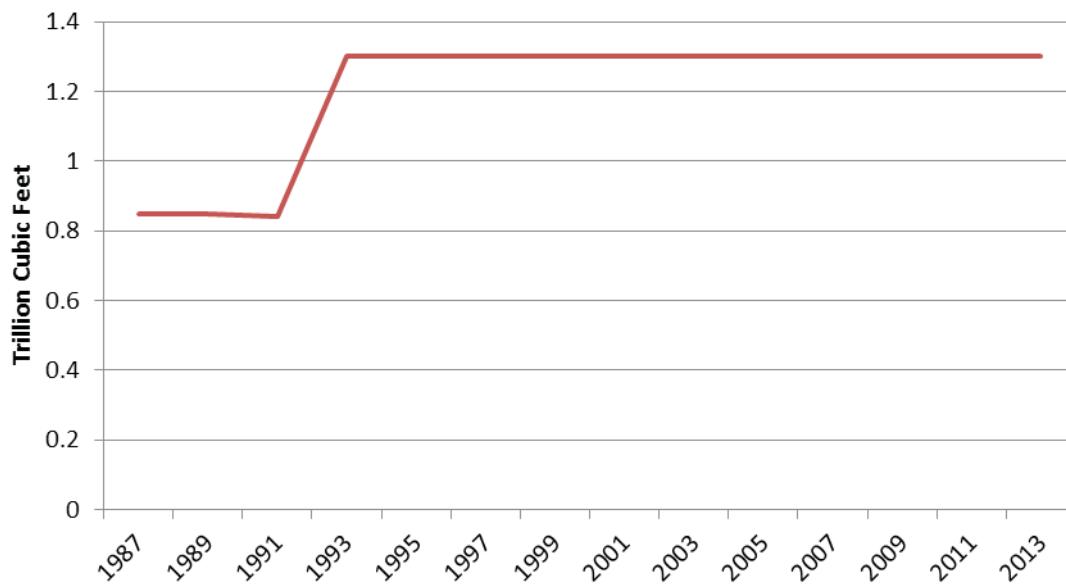
Source: US Energy Information Administration, "Equatorial Guinea Country Analysis," February 2012. <http://www.eia.gov/countries/analysisbriefs/cabs/Equatorial_Guinea/pdf.pdf>.

5.2.2 Gas

Reserves

As of 2013, Equatorial Guinea had 1.3 tcf of proven natural gas reserves (see Figure 5.7). The Alba field, the country's largest natural gas field, contains the majority of the proven reserves. The field has probable reserves of approximately 4.4 tcf. The Alba field is operated by Marathon Oil, which has a 63 per cent interest.²⁶ The field was discovered in 1984 and production started in 1991.

²⁶ US Energy Information Administration, "Equatorial Guinea Country Analysis," February 2012, <http://www.eia.gov/countries/analysisbriefs/cabs/Equatorial_Guinea/pdf.pdf>.

Figure 5.7: Equatorial Guinea proven natural gas reserves (1987-2013)

Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

Production

Natural gas production has increased since the early 1990s, and the country produced 280 bcf in 2012 (see Figure 5.8). It was expected that the amount of gas produced would increase over the next few years as additional gas projects become operational and the Government implemented its plan to reduce flaring, as laid out in its 2006 Hydrocarbons Law (see Section 5.3.1). The Zafiro field, for example, currently flares an estimated 100 MMcf/d of gas. There have been several new gas finds in Equatorial Guinea territory, and exploration activity is set to increase, which is likely to bolster overall natural gas production.²⁷ The Government hopes that both the Aseng and Alen fields will increase natural gas production.

In 2009, Noble Energy sanctioned an oil project in Block I in Aseng oil and gas field, located near Bioko Island, and brought it into operation in November 2011, seven months ahead of schedule. The production rates were 5 Mbbl/d crude oil and 550 bcf/d natural gas in 2011. The natural gas and water are re-injected back into the reservoir to maintain pressure and maximize oil recoveries.²⁸ Hence, the production of gas from Aseng has reduced since the start of 2013. Noble announced that the reduced production of gas would continue in order to maximize oil recoveries.²⁹

The next development near Bioko island is a condensate gas-cycling project at Alen (formerly known as Belinda), in Block O, to the south of Block I, which was sanctioned in 2010. Noble Energy has a 47 per cent interest in Alen. Noble began to operate Alen in May

27 Farey, B., "Equatorial Guinea Says It Has Enough Gas for Second LNG Train," Bloomberg, 18 November 2010. <<http://www.centurionlawfirm.com/equatorial-guinea-says-it-has-enough-gas-for-second-lng-train/>>.

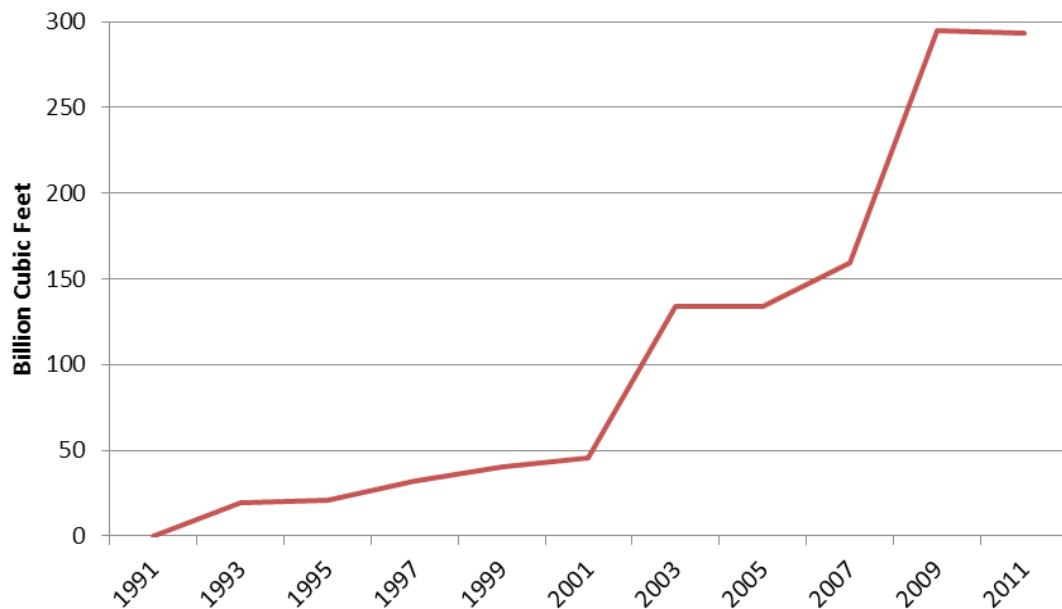
28 A Barrel Full, Aseng Oil Field, April 2013. <<http://abarrelfull.wikidot.com/aseng-oil-field>>.

29 Noble Energy, West Africa Analyst Presentation, 17 December 2013. <<http://www.nobleenergyinc.com/fw/main/West-Africa-140.html>>.

2013, and in December 2013 reported that it was producing 28 Mbbl/d. The production is expected to increase to 30-35 Mbbl/d by mid-2014.

In 2013, Noble Energy conducted a successful appraisal in the Carmen and Diega areas, in Blocks O and I respectively. They expect to finalise their development plans for the area by mid-2014, with production starting in 2016.³⁰

Figure 5.8: Equatorial Guinea gross natural gas production (1991-2011)



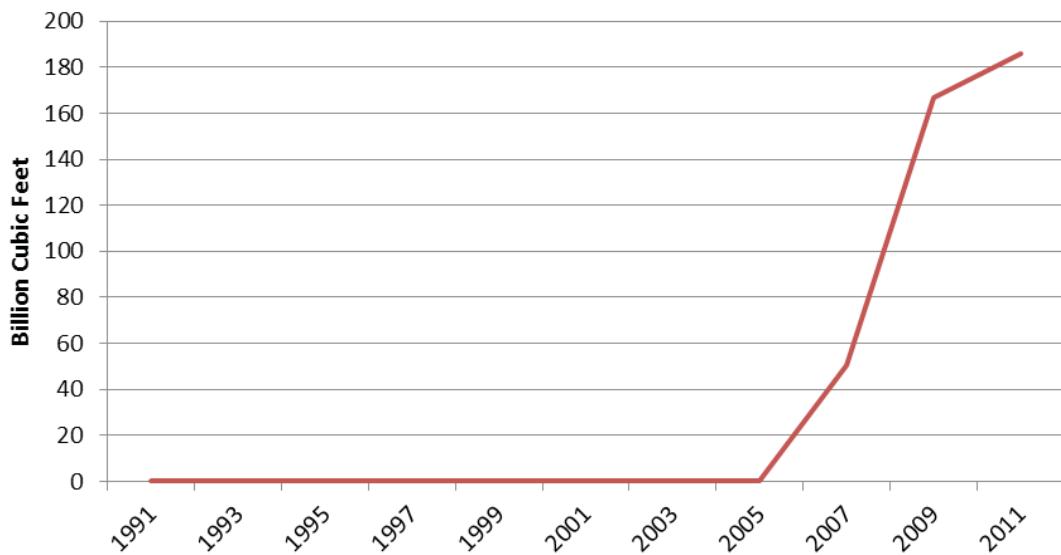
Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

Exports

The country's exports of dry natural gas have increased significantly over the last eight years (see Figure 5.9). Until 2005, the country did not export any natural gas, but by 2011 it was exporting 185 bcf/a of natural gas. Most of the country's natural gas production is exported as LNG. The country currently has one LNG plant which started production in 2007. In total, the country exported an estimated 173 bcf in 2012 with the bulk of this going to Chile and Asia including Japan, South Korea and Taiwan.³¹ The country's domestic consumption remains low, although it has increased over the past 10 years.

30 Ibid.

31 US Energy Information Administration, "Equatorial Guinea Country Analysis," February 2012. <http://www.eia.gov/countries/analysisbriefs/cabs/Equatorial_Guinea/pdf.pdf>.

Figure 5.9: Equatorial Guinea exports of dry natural gas (1991-2011)

Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

5.2.3 Oil and gas infrastructure

Equatorial Guinea currently has no export pipeline infrastructure. The main port serving the oil and gas industry is at Luba on Bioko Island, which serves as an alternative to the congested port at the capital city, Malabo.³²

Oil refinery capacity

Equatorial Guinea exports all of its crude oil. The country imports all the petroleum products it consumes, as it does not have a refinery plant. The country's total petroleum consumption was 2.5 Mbbl/d in 2012 and refined petroleum products consumption was estimated to be 1 Mbbl/d in 2010.³³ In 2010, the Government announced plans to open a 20 Mbbl/d refinery plant in Mbini whose products would be for the domestic market. A conceptual design for the plant was awarded to KBR. However, the project has stalled and has shown little signs of progress since then.

Gas processing

Equatorial Guinea has gas processing capacity, and produces methanol, LNG and LPG on Bioko Island, using gas produced at the Alba offshore field. Train 1 of the Punta Europa LNG plant came online in 2007, with a capacity of 3.7 MMtpa, and Train 2 was commissioned in July 2012. In 2012, the Equatoguinean Ministry of Mines, Industry and Energy announced an agreement on the principles covering the key areas of the value chain of the Train 2 project.³⁴ The LNG plant was one of the world's fastest from

32 Ibid.

33 Ibid.

34 Ministry of Mines, Industry and Energy of Equatorial Guinea, "Communiqué of the MMIE regarding the Train 2 Integrated Project," Guinea Equatorial Press, 23 January 2012. <<http://www>

initial concept to final investment decision. Construction was completed in 2007 with first deliveries of LNG taking place in May 2007. Marathon Oil Corporation operates the plant and holds 60 per cent shares. Compania Nacional de Petroleos de Guinea Ecuatorial (GEPetrol) holds a 25 per cent share. Mitsui and Co Ltd (8.5 per cent) and a subsidiary of Marubeni Corporation (6.5 per cent) are also involved.³⁵

LPG is produced at Marathon Equatorial Guinea Production Limited (MEGPL), which was completed in November 1996.³⁶ It was upgraded between 2003 and 2005, and currently produces approximately 8 Mbbl/d of butane, 14 Mbbl/d of propane and 6 Mbbl/d of condensed gas. LPG is primarily used for domestic energy needs.³⁷ After the LPG and condensate are removed from the natural gas, approximately 130 MMcf/d of the remaining gas is supplied to the AMPCO methanol plant, where it is used to produce an average of 3 Mt/d of methanol.³⁸

5.2.4 Planned oil and gas projects

Extensive exploration activities have taken place near the pre-existing gas fields in Blocks B, B10, C10, A12, Z, S and Y as of mid-2013. Exploration activities are beginning in Blocks H, X and Q. Table 5.2 details planned field developments and Table 5.3 details mid- and downstream planned oil and gas projects in Equatorial Guinea.

Table 5.2: Planned upstream oil and gas projects in Equatorial Guinea

Project	Production rate	Start of production	Block	Companies involved
Alen Field	37.5 Mbbl/d oil 440 MMcf/d gas	Late 2013	O	Noble Energy, GEPetrol and Glencore Exploration
Venus Field	Reserves – 19 MMbbl oil	2014+	P	GEPetrol, VAALCO Energy, Crown Energy, Atlas Petroleum
Alba Field (development)	282 bcf/d gas	2016	Alba	Marathon Oil, Noble Energy Equatorial Guinea Ltd and GEPetrol
Carmen-Diega	N/A	N/A	O and I	Noble Energy, Atlas Petroleum, Glencore Exploration, GEPetrol

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- guineaecuatorialpress.com/noticia.php?id=2281>.
- 35 Hydrocarbons Technology, Equatorial Guinea LNG Project, Bioko Island, Punta Europa, Equatorial Guinea. <<http://www.hydrocarbons-technology.com/projects/bioko-lng/>>.
- 36 Marathon, Marathon 2008 Annual Conference Presentation, 2008. <<http://www.epa.gov/gasstar/documents/workshops/2008-annual-conf/bremer.pdf>>.
- 37 Sonagas, Development Projects. <<http://sonagas-ge.com/en/monetizacion-de-gas/proyectos-en-desarrollo/>>.
- 38 Marathon, Equatorial Guinea Operations. <http://www.marathonoil.com/global_operations/equatorial_guinea/operations/>.

Three fields	Reserves – 2.6 tcf gas	N/A	R	Ophir, Petrofac, Ministry of Mines, Industry and Energy
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Source: Republic of Equatorial Guinea, Ministry of Mines, Industry and Energy, Current activity map, Q2 2013. <http://equatorialoil.com/Activity_map_flyer_Q2_13.pdf>; Offshore Technology, Alen Field, Bioko Island, Equatorial Guinea. <<http://www.offshore-technology.com/projects/alen-gas-condensate-field/>>; HFG awarded contract Alba compression platform." HFG, 9 April 2013. <<http://hfg.heerema.com/content/news-media/news-releases/news-detail/article/hfg-awarded-contract-alba-compression-platform/>>; "Ophir reviewing FLNG bids for offshore Equatorial Guinea gas project," Offshore, 20 February 2014. <<http://www.offshore-mag.com/articles/2014/02/ophir-reviewing-flng-bids-for-offshore-equatorial-guinea-gas-project.html>>.

Table 5.3: Planned mid- and downstream oil and gas projects in Equatorial Guinea

Project	Production rate	Start of construction	Sector	Companies involved
Punta Europa (Phase II)	8 MMtpa	2016	Second LNG train	Equatorial Guinea, LNG Holdings Ltd, Marathon, Equatorial Punta Europa Guinea Production Ltd, Sonagas, Mitsui & Co. Ltd and Marubeni Corp
Offshore	2.5 MMtpa	2016+	Floating LNG storage facility ¹	Equatorial Guinea, Keppel
Offshore	N/A	2017	Oil storage facility ²	Equatorial Guinea, Vopak
Punta Europa	N/A	N/A	International pipeline from Nigeria and Cameroon	Equatorial Guinea, LNG Holdings Ltd, Marathon, Equatorial Punta Europa Guinea Production Ltd, Sonagas, Mitsui & Co. Ltd and Marubeni Corp
Mbini	20 Mbbl/d	N/A	Oil refinery	Ministry of Mines, Industry and Energy

Source: Hydrocarbons Technology, Equatorial Guinea LNG Project, Bioko Island, Punta Europa, Equatorial Guinea. <<http://www.hydrocarbons-technology.com/projects/bioko-lng/>>; Equatorial Guinea aims for FLNG, to build oil terminal," SABC, 28 November 2013. <<http://www.sabc.co.za/news/a/83496b0041fe254cad0bad1c2eddf908/Equatorial-Guinea-aims-for-FLNG,-to-build-oil-terminal->>>.

Punta Europa

In August 2006, a FEED contract was awarded to Bechtel for a second LNG train at the Punta Europa LNG plant in Bioko. Expected to be completed in 2016, the second train will double the plant's current production capacity to close to 8 MMtpa.³⁹ The successful operation of Train 2 relies upon securing long-term gas supply agreements with the owners of surrounding gas resources. Discussions are ongoing with the relevant parties in Equatorial Guinea, Nigeria and Cameroon to secure the necessary gas supplies. The rather hopeful estimate of Equatorial Guinea LNG Holdings Limited is that the plant could produce up to 20 MMtpa LNG in the future.⁴⁰

5.3 Laws and regulations

5.3.1 The Hydrocarbons Law 2006

The Hydrocarbons Law 2006 is the major piece of legislation affecting the oil and gas sector in Equatorial Guinea. It deals with a range of issues including licensing, the award of PSCs, the export of hydrocarbons, and midstream and downstream activities. It also contains provisions on tax, customs, labour, land, competition and local content. A new piece of legislation was released in 2013, called the Petroleum Regulations, but it does not contain major changes and focuses upon gas flaring and mid- and downstream projects' licensing.

The law limits contract areas to 2,650 km², and the Ministry of Mines, Industry and Energy has the right to increase or decrease any contract area (Article 19).⁴¹ Contractors and subcontractors who are not Equatoguinean have to establish a representative branch in the country within six months of their contract entering into force. Companies are also required to establish and maintain a bank account in Equatorial Guinea with a minimum balance. Subcontractors are required to have a bank guarantee approved by the Ministry which has to be submitted when the company registers. Contractors involved in the hydrocarbon industry must construct their own building in which their Equatorial Guinea headquarters are to be located.⁴²

The minimum royalties' rate rose recently from 10 per cent to 13 per cent of gross oil production. Minimum state participation in hydrocarbon activities is set at 20 per cent. Contractors and subcontractors are subject to all income tax laws and regulations in Equatorial Guinea, as well as the fiscal and customs laws of the Monetary and Economic Community of Central Africa (CEMAC).⁴³ All companies operating within the hydrocarbon sector are subject to 35 per cent corporate tax and 15 per cent VAT, as well as customs duties, social contributions and individual income tax.⁴⁴ Operations carried out offshore (outside the international boundaries of the country) do not fall within the scope of Equatorial Guinea's corporate tax. Withholding tax is charged at 6.25 per cent for the supply of services or sales in the oil and gas industry by resident companies and 10 per

39 Hydrocarbons Technology, Equatorial Guinea LNG Project, Bioko Island, Punta Europa, Equatorial Guinea. <<http://www.hydrocarbons-technology.com/projects/bioko-lng/>>.

40 Equatorial Guinea LNG Holdings Limited, Train 2. <http://www.eglng.com/Train_2/>.

41 The Republic of Equatorial Guinea, Hydrocarbons Law of The Republic of Equatorial Guinea, August 2006. <http://sonagas-ge.com/wp-content/uploads/2012/12/ley_001_en.pdf>.

42 Ibid.

43 Ernst and Young, "Doing Business in Equatorial Guinea and Ernst and Young," 2012. <[http://www.ey.com/Publication/vwLUAssets/Doing-business-in-EG/\\$FILE/Doing-business-in-EG.pdf](http://www.ey.com/Publication/vwLUAssets/Doing-business-in-EG/$FILE/Doing-business-in-EG.pdf)>; Ernst and Young, "Global Oil and Gas Tax Guide," 2013. <[http://www.ey.com/Publication/vwLUAssets/2013_global_oil_and_gas_tax_guide/\\$FILE/EY_Oil_and_Gas_2013.pdf](http://www.ey.com/Publication/vwLUAssets/2013_global_oil_and_gas_tax_guide/$FILE/EY_Oil_and_Gas_2013.pdf)>.

44 Ibid.

cent by non-resident companies.⁴⁵

5.3.2 Local content law

The Hydrocarbons Law 2006 includes local content obligations. Certain clauses may be relevant for services needed during the shipping process, for example:

- Local participation: All foreign investments in oil and gas require a minimum local ownership of 35 per cent. This can be fulfilled by allocating shares to the national oil company (see Section 5.4.2).⁴⁶
- Preference to Equatoguinean services: The contractor and its subcontractors must give preference to Equatoguinean services, materials, equipment, consumables and other goods whose quality and time of delivery are comparable to those available internationally, provided that the cost in Equatorial Guinea is no more than 10 per cent above the cost of similar services, materials, equipment, consumables and other equipment available internationally.⁴⁷ The 2013 Petroleum Regulations maintain this regulation.
- Recruitment and integration plan: the 2013 Petroleum Regulations demands that contractors submit plans for replacing foreign workers in Equatorial Guinea with Equatoguinean citizens with the required qualifications and experience.⁴⁸

5.4 Operators and concessionaires

5.4.1 International oil companies (IOCs)

Table 5.4 outlines the main IOCs operating in Equatorial Guinea along with their main projects and further remarks.

⁴⁵ Ibid.

⁴⁶ US Energy Information Administration, "Equatorial Guinea Country Analysis," February 2012. <http://www.eia.gov/countries/analysisbriefs/cabs/Equatorial_Guinea/pdf.pdf>.

⁴⁷ Republic of Equatorial Guinea, Hydrocarbons Law of The Republic of Equatorial Guinea, August 2006. <http://sonagas-ge.com/wp-content/uploads/2012/12/ley_001_en.pdf>.

⁴⁸ Republic of Equatorial Guinea, Petroleum Regulations of The Republic of Equatorial Guinea, 2013. <http://www.equatorialoil.com/Petroleum_Regulations_English.pdf>.

Table 5.4: Major IOCs active in Equatorial Guinea

Operating Company	Projects	Remarks
Ophir Energy plc	Block R - drilling wells Fortuna East, Fortuna West and Tonel 1	Ophir Energy plc announced the successful completion of its 2012 three-well drilling programme in Block R. All three wells exceeded pre-drill recoverable resource estimates. The Fortuna West-1 (R6) exploration well in Block R has added an additional 1.0 tcf of recoverable resources. Ophir Energy is the operator (80 per cent) and GEPetrol has 20 per cent equity.
Noble Energy	Aseng Field, Block I, offshore Bioko Island Alen Field, Block O	The new FPSO associated with the Aseng and Alen fields is capable of producing 80 Mbbl/d of oil and 170 MMcf/d of natural gas. The initial production rate was 50 Mbbl/d. Aseng and Alen combined will add over 35 Mbbl of daily liquid production to Noble Energy. Noble Energy is the operator of the Aseng Field with 40 per cent interest, Atlas Petroleum (29 per cent), Glencore Exploration (25 per cent) and PA Resources (6 per cent) are partners. Noble Energy is the technical operator of Block O (45 per cent) in partnership with Glencore Exploration (25 per cent) and GEPetrol (20 per cent).
ExxonMobil	Zafiro Field, northwest of Bioko Island	Zafiro is operated by an ExxonMobil-led consortium. It was the first deepwater field to be brought on-stream in West Africa and is currently the main producing field in Equatorial Guinea. In 2011, the Zafiro field produced 121 Mbbl/d. While Zafiro continues to be the single largest source of Equatoguinean oil, field production has been declining since its peak at 278 Mbbl/d in 2004. ExxonMobil operate the Zafiro Field (71 per cent), Devon Energy (24 per cent) and GEPetrol (5 per cent) are partners.

Hess Corporation	Offshore of Rio Muni in exploration Block G. Ceiba Field and Okoumé Complex	<p>Hess Corporation is in partnership with Tullow Oil and GEPetrol. Ceiba produces approximately 26 Mbbl/d and Okoumé around 81 Mbbl/d. Production declined after drilling stopped in 2008, when 4D seismic data was used to optimize production. The programme has materially increased production since drilling resumed in June 2013, with net production averaging 4 Mbbl/d for half a year. Liquids production at Ceiba has been declining since its peak from 2005 to 2007, when it averaged around 42 Mbbl/d, and the current production is about 26 Mbbl/d.</p> <p>Okoumé recently reached its peak in 2010 at 81 Mbbl/d; since then, production has begun to decline gradually.</p> <p>Hess operates Ceiba and Okumé (81 per cent) with partners Tullow Oil (14 per cent) and GEPetrol (5 per cent).</p>
Marathon Oil Corporation	Alba Field Punta Europa LPG plant Punta Europa LNG facility Bioko Methanol Plant	<p>The Alba field is operated by Marathon Oil Corporation. The Alba Field currently produces about 70 Mbbl/d: mostly condensates, in addition to other liquids. Associated natural gas that was historically flared from the Alba field is now the main source of feedstock for the Punta Europa LNG plant on Bioko Island.</p> <p>Marathon Oil is the operator of the Alba Field (63 per cent) and Noble Energy and GEPetrol have 34 per cent and 3 per cent working interests respectively.</p>
PanAtlantic	Block W Block K Block 02	<p>PanAtlantic are involved with exploration activities. For all three blocks they are currently undertaking exploratory activities.</p> <p>Murphy operates Block W (40 per cent), whilst PanAtlantic has a 35 per cent interest and GEPetrol has the remaining 20 per cent interest. PanAtlantic operates Block K (80 per cent) in a joint venture with GEPetrol. PanAtlantic are the operators of Block 02 (50 per cent) with partners Novamark (25 per cent) Atlas (5 per cent) and GEPetrol (20 per cent).</p>

Source: "Ophir Begins Drilling Campaign Offshore Equatorial Guinea," Offshore, 7 March 2012. <<http://www.offshore-mag.com/articles/2012/06/ophir-begins-drilling-campaign.html>>; US Energy Information Administration, Equatorial Guinea, August 2013. <<http://www.eia.gov/countries/cab.cfm?fips=ek>>; Noble Energy, West Africa Analyst Presentation, 17 December 2013. <<http://www.nobleenergyinc.com/fw/main/West-Africa-140.html>>; Tullow Oil, "2012 Half-Yearly Results," 13 July 2013. <http://www.tullowoil.com/files/pdf/results/2013_half_yearly_results.pdf>; PanAtlantic, Projects. <<http://panatlanticexploration.com/projects/>>.

5.4.2 National oil companies

GEPetrol

GEPetrol is the Equatoguinean NOC which was established by presidential decree in 2001. GEPetrol is responsible for managing the Government's interest in PSCs and JVs with IOCs. The company manages the state's participation as a shareholder and acts as an agent for the sales of the state's share of hydrocarbons. GEPetrol is responsible for the promotion of open acreage and licensing. The company's remit includes undertaking training programmes to develop the skills of staff. The company is also responsible for marketing and hydrocarbon policy implementation. GEPetrol interacts with the Ministry of Mines, Industry and Energy to coordinate the affairs of the industry in the country but is a separate and autonomous body.⁴⁹

Sociedad Nacional de Gas de la Republic de Guinea Ecuatorial (Sonagas)

Sonagas is the national gas company of Equatorial Guinea and was formed in early 2005.⁵⁰ Sonagas has a Board of Directors composed of nine members including the Chairman. Sonagas is responsible for the state's participation in all gas-related projects in Equatorial Guinea. At the moment this includes:

- Methanol production at the Bioko Methanol Plant, operated by AMPCO Consortium run by Marathon Oil Corporation, Noble Energy and Sonagas (10 per cent), which currently produces about 20 Mbbl/d
- LPG Production at the Punta Europa LPG Plant, operated by Marathon Oil Corporation, Noble Energy and Sonangas (10 per cent), which currently produces about 22.5 Mbbl/d of propane, butane and LPG
- Equatorial Guinea LNG Co, also known as Punta Europa LNG, is a joint venture company consisting of Marathon Oil Corporation (60 per cent), Sonagas (25 per cent), the National Gas Company of Equatorial Guinea, Mitsui & Co., Ltd. (8.5 per cent), and Marubeni Gas Development Corporation Ltd. (6.5 per cent).

Joint ventures (JV) and production sharing contracts (PSC)

In recent years, the Government has passed legislation to increase local participation to a minimum of 35 per cent ownership in all foreign investments. Companies must give preference to local staff and resources. In the hydrocarbon sector, this requirement can be met with a 35 per cent share allotted to the national oil company, GEPetrol. Consequently, the two national oil and gas companies, GEPetrol and Sonagas, are expected to continue

49 Republic of Equatorial Guinea, Ministry of Mines, Industry and Energy, GEPetrol. <<http://www.equatorialoil.com/html/gepetrol.html>>.

50 Sonagas, Organigrama Funcional, 2013. <<http://sonagas-ge.com/empresa/organigrama-funcional/>>.

to play an important, substantive role in future Equatoguinean oil and gas development.

5.5 International suppliers

No major engineering companies have offices in Equatorial Guinea.

5.5.1 Upstream

Keppel

The Aseng field utilizes an FPSO converted from a former VLCC tanker built in 1988 by a Singaporean company, Keppel.⁵¹ Owned and operated by a joint venture of SBM Offshore and GEPetrol, the FPSO has capacity to produce 80 Mbbl/d of oil and 174 MMcf/d of gas with storage capacity of 1.5 MMbbl of oil.⁵²

Dresser-Rand

Dresser-Rand supplied gas turbines, generation sets and compressors for the Aseng FPSO.⁵³

ABB

ABB have worked on four FPSOs in Equatorial Guinea. ABB supplied electrical power and distribution systems to the Aseng and Serpentine FPSOs and provided a range of services and products to the Okoumé Complex's Sendje Ceiba and Topacio FPSOs.⁵⁴

Technip

Technip was awarded a contract to provide engineering, supply, installation and pre-commissioning of the 30 km of flexible pipe system, including six flexible risers, and flexible flowlines and jumpers for the Aseng field FPSO. The contract also comprises the installation of the subsea production system, including manifolds, flying leads and umbilicals.⁵⁵

Bechtel

The Zafiro FPSO is a converted vessel from a VLCC ship. The formerly Swift vessel was originally built in 1973, and converted as Zafiro Producer at the HAM-PMB Bechtel yard

51 "Keppel Shipyard on track to deliver FPSO Aseng for Equatorial Guinea," Keppel Corporation, 16 July 2011. <http://www.kepcorp.com/en/news_item.aspx?sid=2971>.

52 Offshore Technology, Aseng Field. <<http://www.offshore-technology.com/projects/aseng-field/>>.

53 Dresser-Rand, "Floating Production Systems, Power Generation and Compression Solution." <http://www.dresser-rand.com/literature/85242_FPSO.pdf>.

54 ABB, "Reference list: Floating production, storage and offloading (FPSO)," 2012. <[http://www05.abb.com/global/scot/scot267.nsf/veritydisplay/9069859d01d8aad9c1257a91004fc2cb/\\$file/FPSO%20referencelist.pdf](http://www05.abb.com/global/scot/scot267.nsf/veritydisplay/9069859d01d8aad9c1257a91004fc2cb/$file/FPSO%20referencelist.pdf)>.

55 "Technip awarded a subsea contract in West Africa," Technip, 20 January 2012. <<http://www.technip.com/en/press/technip-awarded-subsea-contract-west-africa-0>>.

on Pelican Island, Galveston, Texas in 2000. It produces about 155 Mbbl/d.⁵⁶ Bechtel also conducted the following activities:⁵⁷

- Inspection and life extension of marine systems
- Installation and HUC of production modules and all systems
- Installation of elevated piping and walkways
- Upgrade existing and new quarters
- New helideck and new crane foundations
- New 250 ft flare boom and foundation
- 20-inch export piping and 120 ft long riser porch
- Conversion of cargo wing tanks into trim ballast tanks
- Installation of spread mooring and export tanker mooring.

Heerema Fabrication Group (HFG)

From 2015, the Alba field, which feeds natural gas to the Punta Europa LNG facility, will utilize a compression platform delivered by HFG. The Dutch offshore engineering company will manage the development of a gas compression platform that will bridge-linked to the pre-existing Alba B2 platform.⁵⁸

MODEC

The Japanese engineering group, MODEC, supplied two tension leg platforms for the development of Oveng and Okoumé/Ebano fields. These platforms can process up to 25 Mbbl/d of oil and provide 30 MMcf/d of gas, and provide water treatment and utility systems to support the operations of a group of 10.⁵⁹ These facilities are tied back to the Okoumé Complex's FPSO called the Sendje Ceiba FPSO.⁶⁰

5.5.2 Midstream

There is no oil refining capacity in the country. All the petroleum products consumed in Equatorial Guinea are imported, and are likely to remain so due to the slow progress of the development of a new refinery in Mbini.⁶¹ KBR was awarded a contract for the

56 Offshore Technology, Zafiro, Equatorial Guinea. <<http://www.offshore-technology.com/projects/zafiro/>>; Intelligent Engineering, Zafiro Producer. <<http://www.ie-sps.com/downloads/660.pdf>>.

57 Bechtel, Zafiro Field Development. <http://www.bechtel.com/assets/files/PDF/OGC_Offshore/10%20-%20Zafiro%20Field%20Dev%20rev1.pdf>.

58 "HFG awarded contract Alba compression platform," HFG, 9 April 2013. <<http://hfg.heerema.com/content/news-media/news-releases/news-detail/article/hfg-awarded-contract-alba-compression-platform/>>.

59 MODEC, Oveng TLP & Okoumé/Ebano TLP. <<http://www.modec.com/fps/tlp/projects/oveng.html>>.

60 "Hess Corporation Announces First Oil Production From Okoumé Complex Offshore Equatorial Guinea," Hess, 20 December 2006. <<http://phx.corporate-ir.net/phoenix.zhtml?c=101801&p=irol-newsArticle&ID=943712&highlight=>>>.

61 US Energy Information Administration, Equatorial Guinea, August 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=EK>>.

conceptual studies and project management of the Mbini facility.⁶² Keppel is planning an LNG storage facility with the Equatorial Guinea Government and Vopek is similarly planning an oil storage facility.⁶³

Bechtel

Most of Equatorial Guinea's natural gas is exported as LNG, and there is only one LNG plant in the country, Punta Europa. Bechtel was heavily involved in the development of the LNG plant. Bechtel constructed the Punta Europa's Train 1, which has a capacity of 3.7 MMtpa, utilising the technology of ConocoPhillips. As the primary EPC contractor, the engineering company provided the design and construction of an LNG plant, including refrigeration systems, compressors, condensers, storage tanks, suspension bridge, and marine facilities.⁶⁴ The project was completed under the budget, within 37 months after the full notice to proceed and seven months ahead of schedule.⁶⁵ The off-take agreement is for 3.4 MMtpa, with a duration of 17 years.⁶⁶ The cost of construction was approximately USD 1 billion.⁶⁷

Furthermore, in 2006, Bechtel agreed to provide FEED for Train 2 of the LNG project.⁶⁸

5.5.3 Downstream

Due to the lack of oil refining capacity, Equatorial Guinea exports almost all of its crude oil unrefined. The country imports refined products for its domestic consumption.

Similarly, much of the natural gas produced in Equatorial Guinea is exported abroad, after being liquefied at Punta Europa. Japan has been by far the largest customer since stopping all of its nuclear power plants in 2011 following the nuclear accident. In 2012, Japan accounted for 77 per cent of the exported Equatoguinean LNG.⁶⁹ Japanese utility companies receive cargos of LNG in winter season to meet the peak heating and power demand.⁷⁰

62 "KBR Awarded Conceptual Study and Project Management Services by the Ministry of Mines Industry and Energy," KBR, 10 February 2011. <<http://www.kbr.com/newsroom/press-releases/2011/02/10/kbr-awarded-conceptual-study-and-project-management-services-by-the-ministry-of-mines-industry-and-energy/>>.

63 "Equatorial Guinea aims for FLNG, to build oil terminal," SABC, 28 November 2013. <<http://www.sabc.co.za/news/a/83496b0041fe254cad0bad1c2eddf908/Equatorial-Guinea-aims-for-FLNG,-to-build-oil-terminal->>.

64 Bechtel, Equatorial Guinea LNG. <http://www.bechtel.com/equatorial_guinea_lng.html>.

65 EG LNG, EG LNG Corporate Overview, 2011. <<http://www.eglng.com/content/documents/eglng/EGLNG%20Overview%202011.pdf>>.

66 Hydrocarbons Technology, Equatorial Guinea LNG Project, Bioko Island, Punta Europa, Equatorial Guinea. <<http://www.hydrocarbons-technology.com/projects/bioko-lng/>>.

67 "EG LNG Completes Delivery of First LNG Cargo from Train 1 Plant in Equatorial Guinea." Marubeni, 25 May 2007. <https://www.marubeni.com/dbps_data/news/2007/070525e.html>.

68 "EG LNG lets FEED contract for second LNG train," Oil & Gas Journal, 29 August 2006. <<http://www.ogj.com/articles/2006/08/eg-lng-lets-feed-contract-for-second-lng-train.html>>.

69 US Energy Information Administration, Equatorial Guinea, August 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=EK>>.

70 "Japan Gets LNG Spot Cargo From Equatorial Guinea at Ohgishima," Equatorial Guinea Online, 26 November 2013. <<http://equatorialguineaonline.com/japan-gets-lng-spot-cargo-equatorial-guinea-ohgishima>>.

5.6 Future opportunities for international suppliers

The key conclusions from the country analysis are as follows:

- Businesses in Equatorial Guinea face extremely high levels of political and bureaucratic corruption and the economic growth of the country has not resulted in similar growth in human development.
- The tax rates are high, especially for the extractive industries. The legal framework requires international companies to have a representative branch in Equatorial Guinea and use Equatoguinean bank accounts.
- There have been no recent major oil or gas discoveries. Many of the oil fields are maturing.
- The Bioko LNG facility was one of the few oil or gas infrastructure projects in sub-Saharan Africa to be completed ahead of schedule. Natural gas looks set to become increasingly important in Equatorial Guinea's hydrocarbon sector.
- The level of exploration activity is high, especially for gas fields. Much of the exploration is taking place close to current producing or developing gas fields.
- Equatorial Guinea has had strong trade links with the US, and China could become an increasingly important figure with infrastructure projects in return for oil and gas. Japan is a major export destination for LNG production.
- The domestic market is limited due to the geographical disparity of an already small population. Trading oil and gas products with neighbouring African countries is a possible strategy for the further monetization of Equatorial Guinea's resources.

In 2007, President Obiang Nguema Mbasogo set in motion Equatorial Guinea's "Horizon 2020" development policy. One of the cornerstones of this policy is investment in strengthening the country's economic growth.⁷¹ The oil and gas sector will continue to be crucial to this economic development, and opportunities exist for international suppliers in:

- Equipment for exploration
- Gas extraction projects such as the Carmen and Diega fields
- Support and equipment to extend the life of current producing oil fields
- Suppliers and manufacturers for the Mbini refinery project
- Pipeline developments to neighbouring African countries, potentially subsea
- Punta Europa LNG plant extensions and developments
- Export facilities and transportation for LNG and LPG exports
- Particular government interest expressed for the construction of oil and gas storage facilities.

⁷¹ Republic of Equatorial Guinea, Equatorial Guinea's 2020 Development Plan Guiding Country Toward Emerging Economy, 22 September 2010. <<http://www.bloomberg.com/apps/news?pid=newsarchive&sid=an4d5UxFgFl0>>.

6. Ghana

6.1 Business environment

Ghana was formed from the amalgamation of the former British colonies of the Gold Coast and the Togoland trust territory in 1957. It was the first colony in sub-Saharan Africa to gain independence. Ghana has significant natural resources, and is politically one of the most stable countries in West Africa. Since the discovery of the Jubilee Oil Field in 2007, the country's oil and gas sector has undergone rapid expansion (see Table 6.1 and Figure 6.1).¹ The oil and gas sector is expected to contribute to already significant economic progress over the coming years.²

Table 6.1: Ghana facts and figures

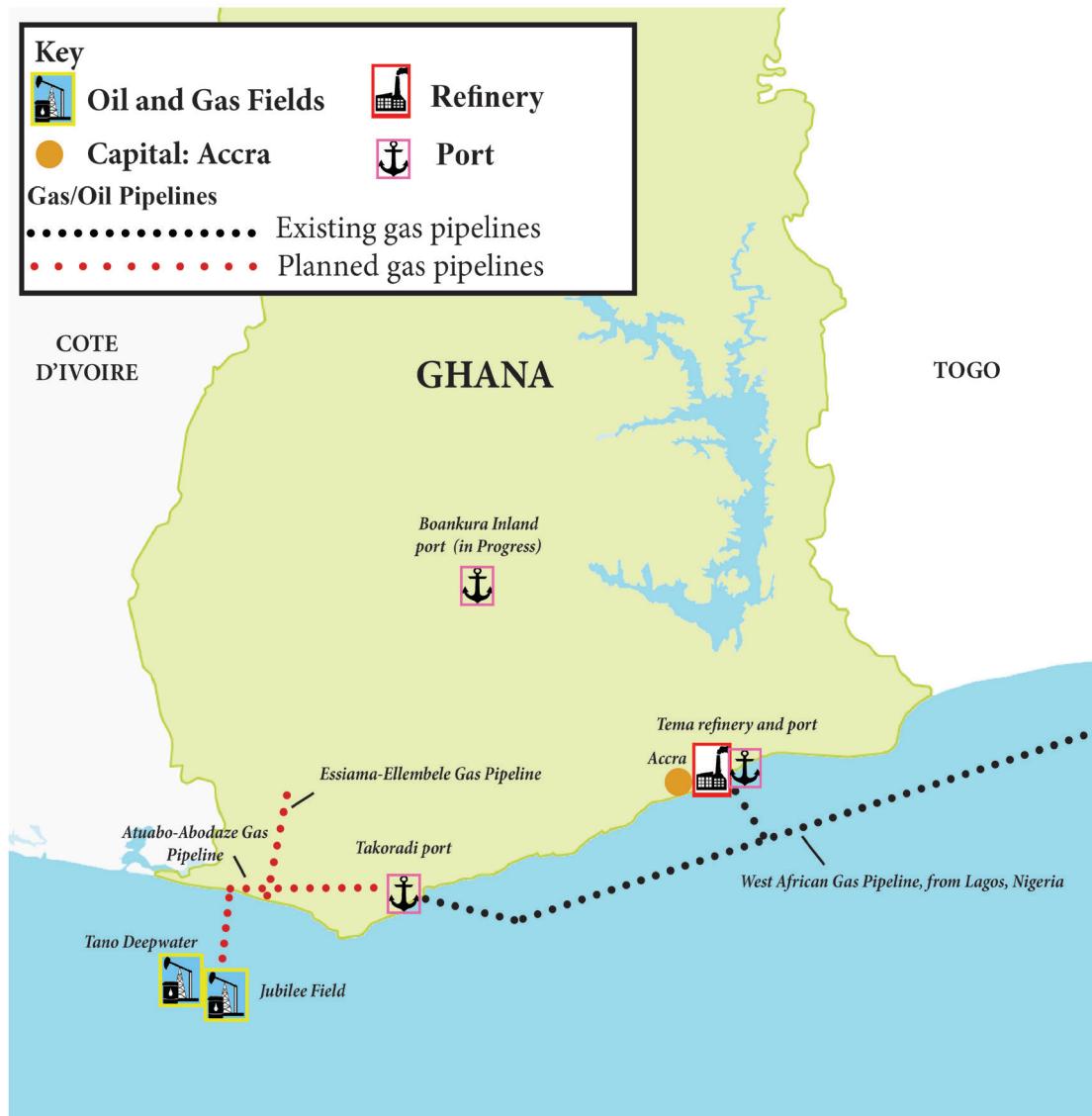
Capital	Accra
Official language	English
Area	238,533 km ²
Population (2014 estimate)	25,758,108
Currency	Cedi
GDP (PPP) total (2013)	USD 90.41 billion
GDP per capita (2013)	USD 3,500
GDP (official exchange rate) total (2013)	USD 45.55 billion
GDP (official exchange rate) per capita (2013)	USD 1,800
State Corruption Index (2013)	63 (out of 177)
Proven oil reserves (2013)	0.66 billion bbl
Proven natural gas reserves (2013)	0.8 tcf
Total oil production (2013)	79.63 Mbbl/d
Total natural gas production (2013)	0 bcf

Sources: United States. Central Intelligence Agency. "The World Factbook: 2013." 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/gh.html>>; US Energy Information Administration. Ghana. Aug. 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=gh>>; Transparency International. "Corruption Perception Index 2013." Dec. 2013. <<http://www.transparency.org/country#GHA>>; OPEC, "OPEC Annual Statistical Bulletin 2013," July 2013. <http://www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB2013.pdf>.

1 US Energy Information Administration, Ghana, August 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=GHA>>.

2 African Development Bank, Ghana Economic Overview, May 2013. <<http://www.afdb.org/en/countries/west-africa/ghana-ghana-economic-outlook/>>

Figure 6.1: Ghana's major oil and gas activity and infrastructure



Base Map of Ghana from FreeVectorMaps.com
©London Research International 2014

6.1.1 Political stability and security

There was a long series of coups before Lt Jerry Rawlings took power and banned political parties in 1981. Multi-party politics was restored in 1992. Ghana is a well-administered country by regional standards and is often seen as a model for other countries in the region to follow. Since 1992, Ghana has developed into a stable constitutional democracy.³ President John Mahama was successfully inaugurated in January 2013, after the death of President John Evans Atta Mills in 2012. In the World Bank's 2012 report, Ghana is strongly placed between the 50th and 60th percentile for every factor on Worldwide Governance Indicators. This performance is indicative of the positive improvements that have taken place in governance, the efficacy of public organisations and economic development.⁴

Land disputes in Northern Ghana turned into ethnic violence in 1994-1995. However, this was considered to be an exceptional case in Ghana as most of the country is heterogeneous with different groups successfully integrated. The number of ethnic groups in Ghana stood at 75 in 2012.⁵ Ethnically-based political parties are unconstitutional under the present Fourth republic. The majority of the population are Christian, with the 18 per cent Muslim population mostly found in the north of the country. Ghana is deemed a Low Risk Zone by Travel security online.⁶ However, armed crime is rising and the southern coastal roads, where the oil industry is centred, are more dangerous. Although not quite so bad as countries further east in the Gulf of Guinea, Ghana has had 17 piracy attacks between 2006 and 2012 in the offshore areas where oil and gas production is situated.⁷

The Economist political risk index rated Ghana as BB.⁸ There is growing public dissatisfaction with poor government service delivery, high inflation, increases in utility prices and ever-increasing corruption allegations. Due to a history of democracy and respect for the law in Ghana any unrest would most likely be on a small scale. Ghana is perceived to be far less corrupt than many other African countries with a corruption perception index ranking of 63 out of 177.⁹ Sectors affected by corruption include the police, political parties and public financial management. Ghana's Revenue Management Act outlines mechanisms for collecting and distributing petroleum revenues by specifying percentages of their allocation into the annual budget, allocations for future generations and contingency funds. The Government has a strong anti-corruption framework in place, established in 1990s, yet their enforcement and independence is in question.¹⁰

6.1.2 Economy

Through two decades of sound administration, a competitive business environment,

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- 3 The World Bank, Ghana Overview, October 2013. <<http://www.worldbank.org/en/country/ghana/overview>>
 - 4 The World Bank, "Worldwide Governance Indicators, 2012," 2012. <<http://info.worldbank.org/governance/wgi/index.aspx#reports>>.
 - 5 United States, Ghana Embassy, About Ghana, 2012. <<http://www.ghanembassy.org/index.php?page=population>>
 - 6 Harvard University, Harvard Travel Assist, Ghana, 20 December 2012. <<https://www.internationalsos.com/MasterPortal/default.aspx?content=landing&countryid=49>>.
 - 7 Red24, "The Rise and Rise of Piracy in the Gulf of Guinea," Think Africa Press, 18 July 2013. <<http://thinkafricapress.com/politics/gulf-guinea-africas-new-piracy-hotspot>>.
 - 8 The Economist Intelligence Unit, Ghana, 13 March 2014. <<http://country.eiu.com/ghana>>.
 - 9 Transparency International, "Corruption Perception Index 2013," December 2013. <<http://www.transparency.org/country#GHA>>.
 - 10 U4 Anti-Corruption Resource Centre, "Overview of corruption and anti-corruption in Ghana," February 2011. <<http://www.u4.no/publications/overview-of-corruption-and-anti-corruption-in-ghana/>>.

and sustained reductions in the population's poverty, Ghana's finances have been strengthened.¹¹ The GDP at official exchange rates was USD 45.55 billion and the per capita GDP was USD 1,800 in 2013. Ghana is well-endowed with natural resources and has a strong agricultural sector, which accounts for approximately one-quarter of GDP and employs more than half of the workforce. The services sector accounts for 50 per cent of the GDP. In 2011, total imports stood at USD 20.1 billion and total exports at USD 14.9 billion.¹² Gold and cocoa productions are the country's foremost exports; Ghana is the second largest producer of cocoa in the world.¹³

Competent macro-economic administration, along with higher prices for oil, gold and cocoa, assisted in maintaining high GDP growth in 2008 to 2012, despite the global economic downturn at the time.¹⁴ The GDP growth rate is currently close to 8 per cent a year.¹⁵ Foreign Direct Investment inflows in 2011 were USD 3.2 billion. The industrial production growth rate and unemployment rate are very positive for sub-Saharan Africa, both at 11 per cent. The oil and gas industries are expected to help the Ghanaian economy to keep making progress.

6.1.3 Infrastructure

Ghana already has a highly urbanised population for the region with over 50 per cent of people living in urbanised areas. Ghana is ranked at 90 out of 144 countries for overall infrastructure in the World Economic Forum report 2013-2014, which is a strong ranking for West Africa.¹⁶ The quality of Ghana's roads and public transport is fair to good. USD 500 million of a Chinese loan has been used to upgrade the Takorai-Kumasi railway line.¹⁷ Over 80 per cent of the population have mobile phone subscriptions.

The weakness of Ghana's infrastructure is a low global ranking for access to electricity, water and telephone lines. Ghana's annual infrastructure funding gap is about USD 0.4 billion per year, chiefly related to power and water.¹⁸ Outmoded transmission and distribution network assets, rapid demand growth, and periodic hydrological shocks in a country with 85 per cent of electricity generated through hydroelectric power, leave the country reliant on high-cost oil-based electricity generation. Exceptionally high losses in water distribution are also reported.

The State Oil Company of Azerbaijan Republic agreed in early 2013 that it will export LNG to Ghana to power industrial customers, which will be supplied through a re-gasification vessel in Benin's Cotonou harbour. Many Chinese companies, such as Jiangxi Corporation for International, Economic and Technical Co-operation, Huawei Technologies and China

11 Index Mundi, Ghana Economy Profile 2013, 6 December 2013. <http://www.indexmundi.com/Ghana/economy_overview.html>.

12 Spring, A. and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.

13 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/gh.html>>.

14 Index Mundi, Ghana Economy Profile 2013, 6 December 2013. <http://www.indexmundi.com/Ghana/economy_overview.html>.

15 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/gh.html>>.

16 World Economic Forum, "Global Competitiveness Report 2013-2014," 3 September 2013. <http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf>.

17 Spring, A. and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.

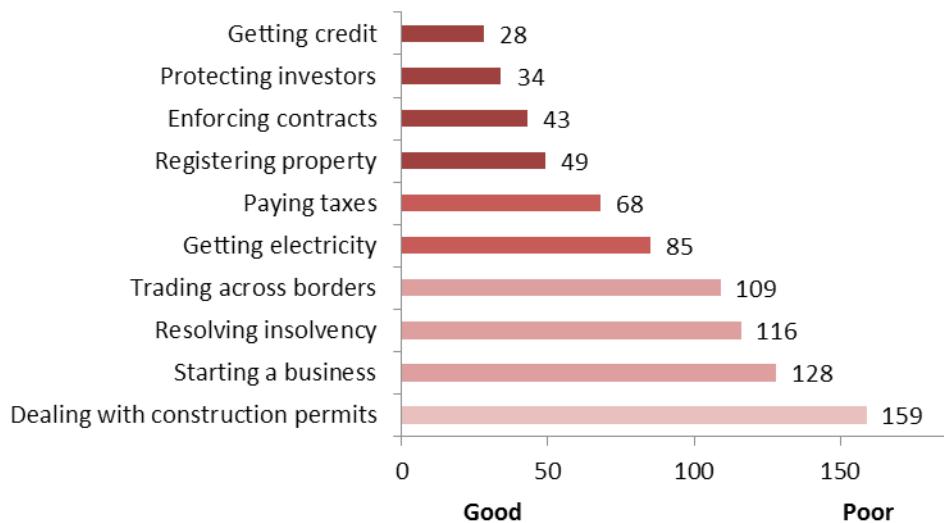
18 Foster, V. and Pushak, N., "Ghana's Infrastructure: A Continental Perspective," World Bank Policy Research Working Paper Series, March 2011. <<http://elibrary.worldbank.org/doi/book/10.1596/1813-9450-5600>>.

Development Bank, are funding infrastructure projects in Ghana which could mitigate the current infrastructure problems.¹⁹ The recent discoveries of oil could help to bridge the infrastructure funding gap.

6.1.4 Operating in Ghana

Ghana is ranked 67 out of 189 countries in the world in relation to the ease of doing business (see Figure 6.2). Consequently, Ghana is a business friendly country.

Figure 6.2: Ease of doing business rankings for Ghana



Note: Countries are ranked from 1 to 189, with 1 as the best and 189 as the most difficult.

Source: Doing Business, "Doing Business 2014. Economy Profile: Ghana," 29 October 2014. <<http://www.doingbusiness.org/~media/giawb/doing%20business/documents/profiles/country/GHA.pdf>>.

Building permit procedures are costly in Ghana. However, Ghana performs higher than the regional average for most other factors.

Enforcing contracts is not particularly costly in Ghana, at an average of 23 per cent of the value of the claim. The cost of importing and exporting and registering property are also low, the latter at only 1 per cent of the property value. Furthermore, the total taxes in Ghana are only 22 per cent of the profit, and the related administration is not exceptionally time consuming.²⁰

The process to obtain electricity is very quick but the cost is rising. The distribution network is old, leading to frequent interruptions. The electrical supply needs reform, as there is a constant risk of droughts which obstructs electricity generation in a country with predominantly hydroelectric power. However, Ghana's electricity supply is more reliable than most other countries in the region.

19 Spring, A. and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.

20 Total taxes include: profit income tax, social contributions, labour, property taxes, turnover taxes and other taxes (such as municipal fees and vehicle taxes).

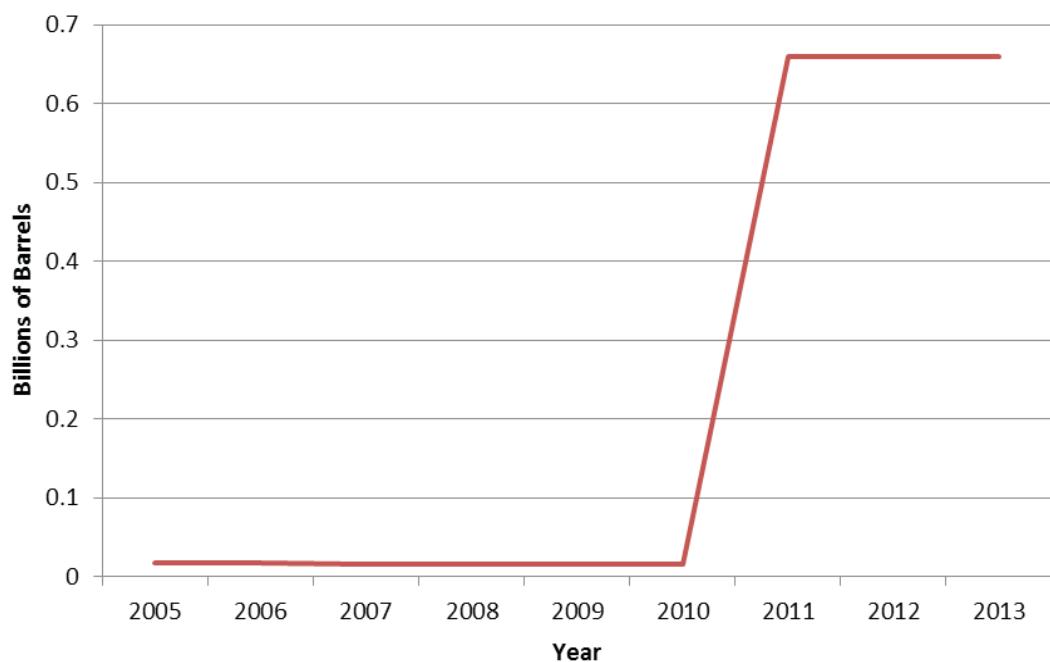
6.2 Resources and infrastructure

6.2.1 Oil

Reserves

Ghana currently has proven oil reserves of 0.66 billion bbl (see Figure 6.3), but a string of discoveries in the Jubilee offshore oil field from 2007 onwards has led to speculation that Ghana's oil reserves may in fact be between about 1.5 and 2 billion bbl from the Jubilee Field and its adjacent sites.²¹ Kosmos Energy discovered the Jubilee Field following the drilling of the Mahogany-1 investigation well in Ghana's deepwaters in 2007. The success at Jubilee led to a number of further oil and natural gas condensate discoveries in the West Cape Three Points and Deepwater Tano Blocks, which includes the Tweneboa, Enyenra and Ntomme (TEN) fields, and they can be expected to bolster the country's proven reserves further.

Figure 6.3: Ghana crude oil reserves (2005-2013)



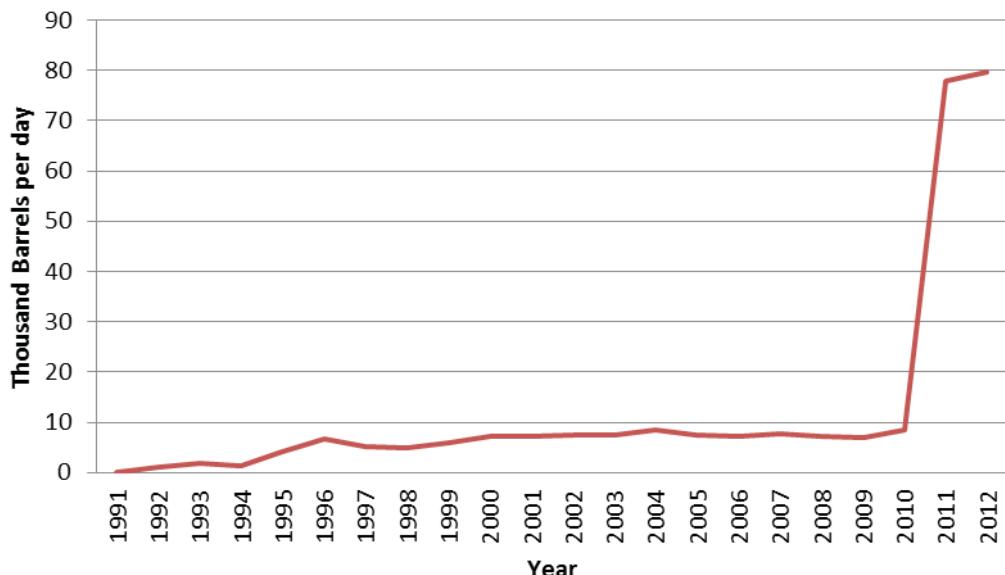
Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

²¹ US Energy Information Administration, Ghana, August 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=GH>>.

Production

Production began at the Jubilee Oil Field in 2010, operated by Tullow Oil, in partnership with Kosmos, Anadarko, Sabre Oil & Gas, and the Ghanaian National Petroleum Corporation. Production reached 80 Mbbl/d by 2012 (see Figure 6.4), and according to Tullow Oil's Operational Review, the output averaged 100 Mbbl/d by mid-2013 and was on course to reach its plateau rate of 120 Mbbl/d by the end of that year (actual production rates for 2013 were not available at the time of writing). Tullow and Kosmos have noted that current rate of delivery of oil by the wells at Jubilee exceeds the capability of the existing infrastructure, and that further development may therefore be needed to attain full production capacity from the field.²² The initial oil output for the TEN discoveries is planned for 2016.²³

Figure 6.4: Ghana crude oil production (1991-2012)



Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

Exports

Figure 6.5 shows the increase in Ghana's oil exports between 2006 and 2010. The average oil exported, including both crude oil and petroleum products, was estimated to have reached 14 Mbbl/d by 2011.²⁴ According to Standard Chartered Research, crude oil is Ghana's second largest export commodity.²⁵ Oil revenue derived from exportation increased from USD 2.7 billion in 2011 to USD 3 billion in 2012, as a result of the increase in production at the Jubilee Field. Ghana has pledged to export certain amounts of oil to

22 Business Monitor International, Ghana, 2013. <<http://www.businessmonitor.com/ghana>>.

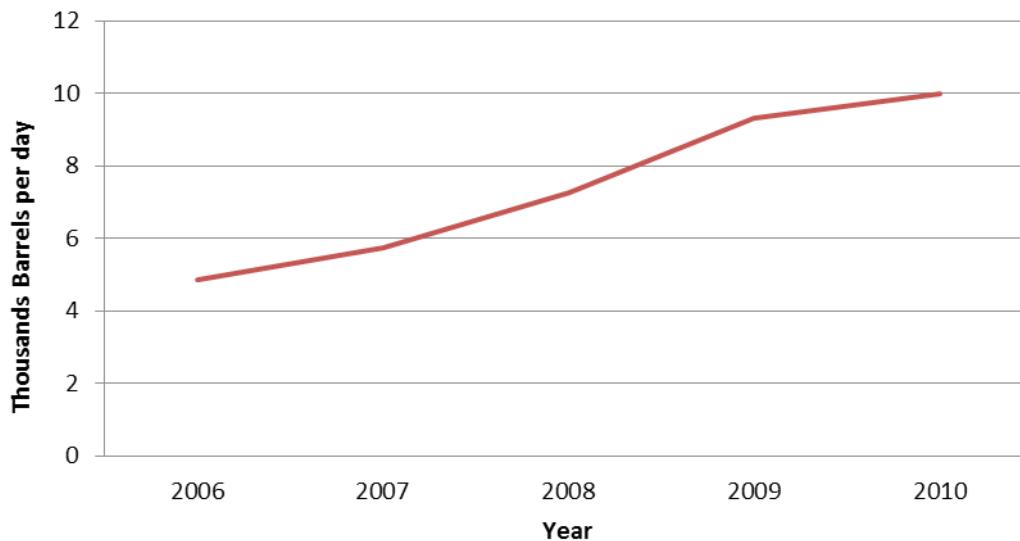
23 KPMG Africa blog, Ghana's oil prospects, July 2013. <<http://www.blog.kpmgafrica.com/ghanas-oil-prospects/>>; Kosmos Energy, Ghana – Oil and Gas Development, 2013. <<http://www.kosmosenergy.com/operations-ghana.php>>.

24 Index Mundi, Ghana Oil – Exports, 6 December 2013. <http://www.indexmundi.com/ghana/oil_exports.html>.

25 Republic of Ghana, Ghana Trade, Oil becomes Ghana's second main export. <<http://www.ghanatrade.gov.gh/Trade-News/oil-becomes-ghanas-second-main-export.html>>.

China in return for soft loans and infrastructure projects in Ghana.²⁶ Ghana is looking to use crude oil at the Tema Refinery for domestic consumption, which could compromise the amount of oil exported.

Figure 6.5: Ghana crude oil export trend (2006-2010)



Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

6.2.2 Gas

Although Ghana had 0.8 tcf of proven natural gas reserves as of 2013, it has not exploited this resource. Ghana relies upon imported gas from Nigeria mostly through the West African Gas Pipeline, to meet their consumption demand. Gas associated with the extraction of oil is currently flared or re-injected.²⁷

6.2.3 Oil and gas infrastructure

Refinery capacity

Ghana's only crude oil refinery was built in 1963, and is located at Tema, about 40 kilometres from the nation's capital of Accra. It has a capacity of 45 Mbbl/d. It was initially named the Ghanaian Italian Petroleum (GHAIP) Company. GHAIP was a 100 per cent Italian-owned business. Its shareholders were the Italian companies, ANIC Societa per Azioni and AGIP Societa per Azioni.²⁸ The Government of Ghana became sole shareholder

26 Ahiadeke, C. et.al. "The Role of China and the U.S. in Managing Ghana's Non-renewable Natural Resources for Inclusive Development," 13 May 2013. <<http://www.brookings.edu/~/media/research/files/reports/2013/08/us%20africa%20china%20trilateral%20dialogue/all%20ghanas%20natural%20resources.pdf>>.

27 US Energy Information Administration, Ghana, August 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=GH>>.

28 Ghana Business Index, Tema Oil Refinery Limited, 2007. <http://business.everythinghana.com/index.php?option=com_mtree&task=viewlink&link_id=126&Itemid=26>.

of GHAIP in April 1977 and in 1991 the facility was renamed as the Tema Oil Refinery (TOR). TOR is presently authorized by its regulations to carry out business as refiners and sellers of petroleum products.²⁹

Due to faulty equipment, Ghana's sole refinery has failed to meet its potential output capacity. In 2013, the Government took steps to remedy this by investing USD 7 million into the purchase of new equipment and the renovation of the facilities. It is anticipated that the capacity of the refinery will increase by 33 per cent by 2015.³⁰

Gas processing capacity

Ghana currently has no gas processing facilities. At present, Ghana flares and re-injects unused natural gas.³¹ Gas is imported from Nigeria via the West African Gas Pipeline to the area of Aboadze where the Takoradi thermal power station is located. Nonetheless, Ghana is constructing their own gas pipeline to the Takoradi power station (see Section 6.2.4, Natural Gas Transportation and Processing Project). The Takoradi power station has a capacity of 220 MW, set to rise to 340 MW in late 2014 when its expansion has been completed.³²

In 2011, according to the Danquah Institute, a Ghanaian public policy and research centre, the main problem for developing oil and gas infrastructure was the cost, especially in the Jubilee Fields. The lack of sufficient infrastructure to utilise the associated gas produced at the Jubilee Field has been a serious set-back for Ghana's gas industry.³³ The Government has also been criticised for their lack of planning, leading to delays in the construction of a gas pipeline in the country.³⁴

6.2.4 Planned oil and gas projects

There are four main planned oil and gas projects in Ghana. Firstly, the TEN project is the major upstream development in Ghana (the Jubilee Field is also undergoing further development and the greater Jubilee area is being explored and appraised). Secondly, Ghana's second oil refinery is being planned. Thirdly, the Natural Gas Transportation and Processing Project aims to construct a processing plant with pipelines to a gas-fired power station. Finally, a floating LNG terminal is being considered.

TEN project

The Deepwater Tano agreement area is operated by Tullow (47.175 per cent), with stakes held by Kosmos (17 per cent), Anadarko (17 per cent), Sabre Oil & Gas Holdings Ltd, a subsidiary of Petro SA, (3.825 per cent), and the Ghana National Petroleum Corporation

29 Ibid.

30 Dotoh, E., "Tema Oil Refinery of Ghana Sees 33% Capacity Expansion by 2015," Bloomberg, 16 September 2013. <<http://www.bloomberg.com/news/2013-09-16/tema-oil-refinery-of-ghana-sees-33-capacity-expansion-by-2015.html>>.

31 US Energy Information Administration, Ghana, August 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=GH>>.

32 "TAQA breaks ground on gas-fired power plant expansion in Ghana," PennEnergy, 11 April 2013. <<http://www.pennenergy.com/articles/pennenergy/2013/04/taqa-breaks-ground-on-gas-fired-power-plant-expansion-in-ghana.html>>.

33 "Ghana losing \$1bn due to undeveloped gas infrastructure," Ghana Web, 22 December 2011. <<http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=226189>>.

34 Asiamah, F., "Ghana: Govt Lacks Plans for Jubilee Gas," AllAfrica, 15 April 2011. <<http://allafrica.com/stories/201104150896.html>>.

(15 per cent). The TEN fields are three oil reserves under development, ranging between 1,100m and 1,800m in depth.³⁵ The first production from the TEN fields is expected in 2016 and is estimated to have a plateau production rate of 80 Mbbl/d.³⁶ The TEN project is expected to have a peak production rate of 100 Mbbl/d by 2018. This project is expected to recover approximately 216 MMbbl of oil across its lifetime.³⁷ Table 6.2 gives the current service providers for the activities at the fields.

Table 6.2: Oil services providers for the TEN project in Ghana

Oil service provider	Services rendered
MODEC	Provision, charter and lease, procedures and maintenance of the FPSO.
2H Offshore (Acteon subsidiary)	Delivery of flexible riser system.
FMC Technologies, Inc.	Subsea systems provider. This includes subsea trees, manifolds, tooling, associated subsea control systems and systems integration.
Technip and Subsea 7	Joint contractors for offshore installations. This includes engineering, fabrication and installation of flexible stools, water injection wells, flexible flowlines and risers.

Source: Your Oil and Gas News, Ghana. <<http://www.youroilandgasnews.com/ghana-news.php?region=Africa>>.

New Alpha-Refinery Ghana

A second oil refinery plant in Ghana is currently in the planning stage. The New Alpha Refinery-Ghana is being developed by a South African founded business with a subsidiary in Ghana. A fixed date has not yet been set for the opening of the new refinery. The refinery will be established in the West of Ghana and is projected to have a capacity of 200 Mbbl/d.³⁸ Along with the improvements made to the Tema Oil Refinery, this project will potentially bring Ghana's refinery capability up to around 260 Mbbl/d.

Natural Gas Transportation and Processing Project

Ghana National Petroleum Corporation (GNPC) proposed the Natural Gas Transportation and Processing Project for gas from the Jubilee Field. A section of the pipeline to connect

35 "MODEC, Inc. awarded FPSO contracts for TEN project Deepwater Tano in Ghana," MODEC, 5 August 2013. <http://www.modec.com/up_pdf/20130805_press-release_en.pdf>; Subsea IQ, TEN Cluster, 20 March 2014. <http://www.subseaiq.com/data/Project.aspx?project_id=1038&AspxAutoDetectCookieSupport=1>.

36 Koons, C. and Williams, S., "Itochu, Mitsui Eye Stake in Tullow Oil Ghana Project," The Wall Street Journal, 19 November 2013. <<http://online.wsj.com/news/articles/SB10001424052702303985504579207602382335142>>.

37 Offshore Technology, TEN Development Project, Deepwater Tano License, Ghana. <<http://www.offshore-technology.com/projects/ten-development-project-deepwater-tano-ghana/>>.

38 "Ghana to get a second oil refinery," The New Ghanaian Online. <<http://mytngonline.com/ghana-to-get-second-oil-refinery/>>.

the rigid flowline and the flexible riser has been completed by Technip (see Section 6.5.2, Technip).

The gas processing plant in Atuabo was due to be operational in June or July 2014 but has been delayed until September 2014.³⁹ The project cost an estimated USD 750 million and was undertaken by Sinopec (see Section 6.5.2, Sinopec). The capacity of the gas processing plant will be 150 MMcf/d.⁴⁰ The project is vital because gas cannot be re-injected into the Jubilee Field because the gas pressure is too high – consequently, oil production is significantly reduced and the gas has to be flared and wasted.⁴¹

A 111 km gas pipeline is under construction from Atuabo to Aboadze where the Volta River Authority's Takoradi gas-fired thermal power plant generates electricity. The Takoradi gas-fired power plant is also under-going expansion set to be completed by 2016.⁴²

Ghana Gas is constructing a 75km natural gas pipeline from Essiama in the Ellembele District to Prestea in the Prestea Huni-Valley District of the Western Region for power generation.⁴³

Floating LNG receiving terminal

Ghana plans to build a floating LNG terminal off its Atlantic Ocean coast, by 2016. The LNG terminal would receive imported gas to then produce up to 1,500 MW of electricity. The capacity of the terminal is proposed to be 450 MMcf/d of gas.⁴⁴

6.3 Laws and regulations

6.3.1 Policies and governance of oil and gas in Ghana

Since the discovery of commercial oil and gas reserves in Ghana, the country has been in the process of updating its legislation. Presently, the Petroleum Bill is under consideration for renewal and remains open to parliamentary consideration. Key legislation relating to the sector includes the Petroleum (Exploration and Production) Act, 1984 (the "Petroleum Law"), the Ghana National Petroleum Corporation Act 1983 (Act 64), the Petroleum Income Tax Act 1987 (Act 188), and the Petroleum Commission Act, 2011 (Act 821).⁴⁵ Details are given in Table 6.3.

39 "Atuabo Gas Processing Plant to be ready this month," GhanaWeb, 8 March 2014. <<http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=302799>>; "UPDATE 1-Ghana to start gas processing from Jubilee field in Q3," Reuters, 10 March 2014. <<http://www.reuters.com/article/2014/03/10/ghana-gas-idUSL6N0M728X20140310>>.

40 Ghana Gas, FAQs About The Project. <<http://www.ghanagas.com.gh/en/faqs/about-the-project.php>>.

41 Dontoh, E., "Ghana Jubilee Field to Probably Flare Gas Starting Next Month," 24 January 2014. <<http://www.bloomberg.com/news/2014-01-24/ghana-jubilee-field-to-probably-flare-gas-starting-next-month.html>>.

42 Ghana Gas, FAQs About The Project. <<http://www.ghanagas.com.gh/en/faqs/about-the-project.php>>.

43 Ibid.

44 Obulutsa, G., "Ghana plans LNG power project to generate 1500 MW by 2016," The Africa Report, 11 September 2013. <<http://www.theafricareport.com/Reuters-Feed/Ghana-plans-LNG-power-project-to-generate-1500MW-by-2016.html>>.

45 Freshfields, "Ghana Oil and Gas," March 2013. <http://www.freshfields.com/uploadedFiles/SiteWide/News_Room/Insight/Africa_ENR/Ghana%20oil%20and%20gas.pdf>.

Table 6.3: Major legislation influencing oil and gas in Ghana

Law	Year	Description
Ghana National Petroleum Corporation Law	1983	This legislation established the GNPC and provided its mandate “to, amongst other things, undertake the exploration, development, production and disposal of petroleum.
Exploration and Production Law	1984	Authority was given to the Ministry of Energy (representing the Government of Ghana) and GNPC to negotiate petroleum contracts, including fiscal terms such as royalties, and the GNPC was empowered to operate in all open acreage, either independently or in conjunction with foreign partners.
Petroleum Income Tax Law	1987	This legislation provided the framework for the taxation of contractors' income undertaking upstream petroleum activities.
Petroleum Commission Act	2011	This Act established the Petroleum Commission, which is responsible for the regulation and management of the use of petroleum resources, and implementation of related policy.
Petroleum Revenue Management Act	2011	Ensures revenue from up- and midstream petroleum activities are collected, allocated and managed through a fiscal framework provided by this Act.
Petroleum (Local Content and Local Participation) Regulation	2013	The Regulation aims to ensure that oil finds benefit the local population, whilst investors also get sufficient returns.
Ghana Petroleum Regulatory Authority Bill	Draft approved in 2010. Bill not passed as of December 2013	The Bill seeks to separate GNPC's current conflicting functions as regulator and operator by establishing an independent body, the Ghana Petroleum Regulatory Authority (GPRA), to regulate up- and midstream oil and gas undertakings. Its purpose is also “to create an enabling environment for increased private sector participation and investment in the petroleum sector, and to strengthen the regulatory framework for healthy competition and quality assurance.

Source: see footnotes.⁴⁶

The key institutions involved in regulating the upstream petroleum sector include the Government (through the Ministry of Energy), the Parliament of Ghana, and the Petroleum Commission.⁴⁷ Table 6.4 describes the roles of these organisations.

Table 6.4: Key institutions in Ghana's petroleum industry

Key Institutions	Key Roles
Parliament of Ghana	Only the state can grant rights for the exploitation of petroleum resources in accordance to a Petroleum Agreement. Article 268(1) requires that Petroleum Agreements for the exploitation, development and production of oil and gas must be ratified by parliament.
Ministry of Energy	In accordance with the Fundamental Petroleum Policy, the Ministry of Energy is authorised to build, employ and evaluate policies. The Petroleum law states the Ministry of Energy is responsible for: <ul style="list-style-type: none"> • Issuing rights to explore, develop and produce petroleum • Approving the transfer of rights to explore, develop and produce petroleum.
Petroleum Commission	The Petroleum Commission is responsible for managing and regulating upstream sector policies. These include: <ul style="list-style-type: none"> • All health and safety and environmental laws • Local participation regulations • The regulation of petroleum operations • The review and ratification of appraisal plans.

Source: Freshfields, "Ghana Oil and Gas," March 2013. <http://www.freshfields.com/uploadedFiles/SiteWide/News_Room/Insight/Africa_ENR/Ghana%20oil%20and%20gas.pdf>.

6.3.2 Local content law

To ensure that Ghanaians are put at the forefront of all petroleum activities and to

46 Freshfields, "Ghana Oil and Gas," March 2013. <http://www.freshfields.com/uploadedFiles/SiteWide/News_Room/Insight/Africa_ENR/Ghana%20oil%20and%20gas.pdf>; Corporate Africa, Oil & Gas. <<http://corporate-africa.com/oil&gas.html>>; PWC, "Tax Guide for Petroleum Operations in Ghana," 2013. <<http://www.pwc.com/gh/en/pdf/ghana-petrol-tax-guide-2011.pdf>>; Republic of Ghana, Petroleum Commission Act, 2011, §2. <http://ghanatrade.gov.gh/file/petroleum%20laws/petroleum_commission.pdf>; Republic of Ghana, Petroleum Revenue Management Act, 2011, §1. <http://www.mofep.gov.gh/sites/default/files/reports/Petroleum_Revenue_Management_Act_%202011.PDF>; "Parliament passes Local Content Bill for oil sector," GhanaWeb, 21 November 2013. <<http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=292671>>; Republic of Ghana. Ghana Petroleum Regulatory Authority Bill. <<http://www.eisourcebook.org/cms/files/attachments/policy-legal-contractual-regulatory/Ghana%20-%20Petroleum%20Regulatory%20Authority%20Bill.pdf>>.

47 Ibid.

make sure that they benefit from the country's resources, the Petroleum (Local Content and Local Participation) Regulation, 2013, was passed. The purposes of the regulation include the promotion of value-added services and job opportunities through the use of local expertise, goods and services, businesses and financing in the petroleum industry in Ghana.

The Petroleum Regulation requires entities in the petroleum industry to submit their localized content plans which comply with localized content standards. These local standards consider the provision of goods and services, recruitment and training events and the transfer of advanced expertise and skills related to petroleum operations to the GNPC, the Petroleum Commission and Ghanaians.⁴⁸

The law requires that:

- There is at least a 10 per cent participation of local Ghanaian companies when new foreign exploration firms enter the Ghanaian market.
- A target is set for 70-80 per cent of management and technical staff to be locally trained by 2023.
- First consideration is given to Ghanaian independent operators in awarding oil field licencing, oil blocks and other contracts. Bids with the highest number of Ghanaian participants will be selected.
- Local goods and services are preferred, provided that they cost no more than 10 per cent above the imported alternatives.⁴⁹

6.4 Operators and concessionaires

6.4.1 International oil companies (IOCs)

The recent discoveries in Ghana have brought an increase in investment in the country's oil and gas sector by IOCs. This recent development in Ghana has also caused some international companies, such as Lushann International Energy Corporation (LIEC) of Houston, to collaborate with Ghana's state-owned oil and gas company GNPC in a joint venture forming Saltpond Offshore Producing Company Ltd in 2000. These investments in Ghana are due to the fact that Ghana is a frontier country with comparative advantage in terms of its untapped oil reserves.

Table 6.5 gives the details of the locations, sizes and durations of current IOC operations in Ghana.

48 "Parliament passes Local Content Bill for oil sector," GhanaWeb, 21 November 2013. <<http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=292671>>.

49 Chris, M., "Ghana passes local content law," Oil in Uganda, 28 November 2013. <<http://www.oilinuganda.org/features/companies/ghana-passes-local-content-law.html>>.

Table 6.5: Major IOCs active in Ghana

Operating Company	Block	Remarks
Tullow Oil	Jubilee Field Deepwater Tano West Cape Three Points	<p>Tullow Oil made its largest ever discovery at the Jubilee Field in 2007, which straddles the Deepwater Tano and West Cape Three Point blocks. Tullow Oil operates the field. Oil was first produced from the field in 2010.</p> <p>The development plan for the TEN fields, located in the Deepwater Tano Block, was approved in 2013. Tullow Oil has a 50 per cent working interest in the Deepwater Tano Block. Other partners in the Deepwater Tano Block are Kosmos Energy (18 per cent), Anadarko (18 per cent) and GNPC (10 per cent).</p> <p>Tullow Oil has 23 per cent working interest in the West Cape Three Points Block. Other partners in the West Cape Three Points Block are Kosmos Energy (31 per cent), Anadarko (31 per cent) E.O. Group (3 per cent), Sabre Oil & Gas (2 per cent) and GNPC (10 per cent).</p>
Kosmos Energy	Jubilee Field Deepwater Tano West Cape Three Points	<p>Kosmos Energy served as Technical Operator for the development of the Jubilee Field and is implementing the second phase of development, bringing new production wells and water injection wells online. Current production of oil at the Jubilee Field is 104 Mbbl/d.</p> <p>Kosmos is advancing appraisal activities at three locations in the West Cape Three Points Block.</p>
Anadarko	Jubilee Field West Cape Three Points Deepwater Tano	Anadarko, the US oil exploration and gas company, has interests in both the West Cape Three Points and Deepwater Tano Blocks. Anadarko discovered the Wawa oil prospect in the Deepwater Tano Block, north of the TEN development.
Luk Oil	Cape Three Points Deepwater	Luk Oil is the operator of the field (56.6 per cent) and PanAtlantic (28.4 per cent) and GNPC (15 per cent) hold interests in the block. Three deepwater discoveries were made between 2010 and 2011 and a new stage of exploratory drilling is due in 2014.

Lushan International Energy Corporation	Saltpond Field	<p>Saltpond Offshore Producing Co. is a joint venture agreement between Lushan International Energy Corporation (55 per cent) and GNPC (45 per cent) agreed in 2000 to redevelop the Saltpond field. Oil production from the Saltpond Field is 600 bbl/d. Two new production wells were planned in 2009 to increase production to 2 Mbbl/d.</p> <p>Lushan International Energy Corporation was granted the right to develop up to 400 MW of power generation infrastructure to commercialise the Saltpond Field natural gas resources.</p>
Hess	Deepwater Tano/Cape Three Points	In a Joint Venture with GNPC (10 per cent), Hess (90 per cent) has made seven discoveries in the block and has submitted appraisal plans.
Medea Development	East Cape Three Points	Medea will operate the block (36 per cent); Cola Natural Resources Ghana hold 54 per cent and GNPC hold 10 per cent interest. The contract was ratified in late 2013. Medea is planning for extensive seismic surveys of the block.
ENI	Offshore Cape Three Points Offshore Keta	<p>Eni is the operator of Offshore Cape Three Points (47.2 per cent). Other parties with an interest include Vitol (37.8 per cent) and GNPC (15 per cent). The Sankofa discovery was made 35 km from the Jubilee Field and an appraisal well was drilled in 2013.</p> <p>Eni has a 35 per cent working interest in the Offshore Keta Block. Partners in the Offshore Keta Block are Afren (35 per cent), Mitsui (20 per cent) and GNPC (10 per cent). Exploration is commencing at the Keta Block which borders Togalese waters.</p>
Vitol	Offshore Cape Three Points Offshore Accra	Vitol has a 30 per cent non-operating interest in the Offshore Accra Block, Tap Oil is the operator (17.5 per cent) and other partners are Ophir (20 per cent) and Afex Oil (20 per cent). A number of prospects for exploration have been identified from seismic data.

Source: see footnotes.⁵⁰

50 Ghanaian Ministry of Finance and Economic Planning, "Report on the Aggregation and Reconciliation of Oil and Gas Sector Payments and Receipts: 2010-2011," February 2013. <<http://eiti.org/files/Ghana-2010-2011-Oil%26Gas-EITI-Report.pdf>>; Kosmos Energy, Jubilee Field. <<http://www.kosmosenergy.com/operations-ghana-jubilee-field.php>>; "SOPCL to increase production." Saltpond Offshore Producing Company Limited, 9 September 2009. <<http://www.saltpondoffshore.com/newsreleases1.html>>; Luk Oil, Ghana. <<https://lukoil-overseas.com/projects/ghana/>>; "Ghana Parliament ratifies

6.4.2 National oil companies

Ghana National Petroleum Corporation (GNPC)

The GNPC was established as a state-owned entity and is given legal backing by two main statutes, Provisional National Defence Council (PNDC) Laws 64 and 84. The PNDC Law 64 of 1983 mandates GNPC “to undertake the exploration, development, production and disposal of petroleum.” PNDC Law 84 established the legal framework for contracts between the state, GNPC and oil companies in upstream petroleum operations. GNPC’s role is to secure the right combination of domestic and foreign investments for the exploration, development, production and disposal of petroleum in Ghana.⁵¹

The Petroleum Department of the Ministry of Fuel and Power imported petroleum products prior to the establishment of GNPC. The Technical Directorate of the Ministry of Fuel and Power and the Geological Survey Department co-ordinated petroleum exploration activity and received reports on operations. In order to provide an adequate and reliable supply of petroleum products and reduce the country’s dependence on petroleum products imports by developing the country’s own petroleum resources, the Government established GNPC.⁵²

Joint ventures (JV) and production sharing contracts (PSC)

JVs are undertaken as agreements between the GNPC and IOCs. Non-indigenous service companies, contractors, and subcontractors are required to have JV arrangements with indigenous Ghanaian companies that provide the Ghanaian company with an equity participation of at least 10 per cent.⁵³

The major form of production sharing contract is through Petroleum Agreements (PA). Under terms of a PA, the Government of Ghana awards right to contractors to explore and produce petroleum in a nominated contract area. There is a model PA in Ghana which is adapted accordingly to reflect the terms agreed between the Government of Ghana, the GNPC and the Contractor. The PA requires approval by the Parliament of Ghana and will usually specify the area that has been applied for and awarded, the exploration period and the related work program and cost, and sanctions in case of default. It also states the benefits to be derived by the state in the form of royalties and income tax and the contractor’s portion of benefits and responsibilities.⁵⁴

“East Cape Three Points block petroleum agreement,” Adomonline, 10 December 2013. <http://www.adomonline.com/news_details.php?article=2363>; “Eni enters Ghana through the acquisition of two offshore exploration blocks,” Eni, 28 September 2009. <http://www.eni.com/en_IT/media/press-releases/2009/09/2009-09-28-eni-enters-ghana.shtml>; “Three New Oil Firms Enter Accra Block Offshore Ghana,” Offshore Energy Today, 13 December 2012. <<http://www.offshoreenergytoday.com/three-new-oil-firms-enter-accra-block-offshore-ghana/>>.

51 Gulf Oil and Gas, Ghana National Petroleum Company. <<http://www.gulfoilandgas.com/webpro1/prod1/SupplierCat.asp?sid=10019>>.

52 OilVoice, Ghana National Petroleum Company. <http://www.oilvoice.com/Description/Ghana_National_Petroleum_Corporation_GNPC/b6f09016.aspx#gsc.tab=0>.

53 PWC, “Tax Guide for Petroleum Operations in Ghana,” 2013. <<http://www.pwc.com/gh/en/pdf/ghana-petrol-tax-guide-2011.pdf>>.

54 Ibid.

6.5 International suppliers

Siemens, GE, ABB, WorleyParsons and Technip have offices in Ghana. ABB considers Ghana as one of the next 10 target countries for the company's growth. Technip also has a fabrication yard in Sekondi, which offers fabrication services, as well as logistic support to vessels operating in Ghana.⁵⁵ Technip is active in subsea, offshore and onshore segments of Ghana.

6.5.1 Upstream

MODEC

The FPSO at the Jubilee Field was contracted to the Japanese engineering contractor MODEC in 2008. The FPSO Kwame Nkrumah MV21 has capacity to process more than 120 Mbbl/d of oil, and to inject more than 230 Mbbl/d of water and 160 MMcf/d of associated gas. The FPSO was commissioned in November 2010, and has up to 20 years of service life.⁵⁶ The price of the vessel was USD 875 million.⁵⁷ The field's subsea equipment was delivered by FMC Technologies' Subsea OnDemand. They were contracted in 2008, and the scope of their work included the delivery of subsea equipment, such as subsea production trees, subsea gas-injection trees and water-injection trees, as well as the design and fabrication of four-slot manifolds.⁵⁸

MODEC is also involved in the TEN Development project. Tullow Ghana Limited, Tullow Oil's subsidiary, awarded a subsidiary of MODEC, TEN Ghana MV25 B.V, contracts for the supply, charter and lease, operations and maintenance of an FPSO for the TEN fields. MODEC is responsible for the engineering, procurement, construction, mobilization and operation of the FPSO. A VLCC Centennial J will be converted to an FPSO, which will have capacity to handle the oil production of 80 Mbbl/d and 170 MMcf/d of gas. The expected storage capacity is 1.7 MMbbl. MODEC is scheduled to deliver the FPSO in 2016.⁵⁹

Technip

Tullow Oil awarded contracts worth approximately USD 1.23 billion to Subsea7 led by Technip for the TEN Development project. Technip's share of these contracts is USD 730 million. Technip is responsible for engineering, fabrication and installation of risers, flowlines and spools, installation of static and dynamic umbilicals, and engineering, pre-fabrication, final assembly and installation of well rigid jumpers.⁶⁰

⁵⁵ Technip, "Technip in Ghana," February 2013. <http://www.technip.com/sites/default/files/technip/publications/attachments/Technip_in_Ghana_Feb2013_web.pdf>.

⁵⁶ MODEC, FPSO Kwame Nkrumah MV21. <http://www.modec.com/fps/fpso_fso/projects/jubilee.html>.

⁵⁷ "Jubilee Oil Field shuts down," Modern Ghana, 11 September 2013. <<http://www.modernghana.com/news/488965/1/jubilee-oil-field-shuts-down.html>>.

⁵⁸ FMC Technologies, IPT Jubilee. <<http://www.fmctechnologies.com/en/SubseaSystems/GlobalProjects/Africa/Ghana/Jubilee.aspx?tab={3791B9D5-ECC3-43E7-984C-BDE51CB1D208}>>.

⁵⁹ "MODEC, Inc. Awarded FPSO contracts for TEN Project, Deepwater Tano in Ghana," MODEC, 5 August 2013. <http://www.modec.com/up_pdf/20130805_press-release_en.pdf>; "Tullow Awards Ghana FPSO Contract to Modec," Offshore Energy Today, 5 August 2013. <<http://www.offshoreenergytoday.com/tullow-awards-ghana-fpso-contract-to-modec/>>.

⁶⁰ "Technip awarded major contracts for the TEN project in Ghana, reinforcing its presence in West Africa," Technip, 31 October 2013. <<http://www.technip.com/en/press/technip-awarded-major-contracts-ten-project-ghana-reinforcing-its-presence-west-africa>>.

6.5.2 Midstream

Technip

In 2010, Technip was awarded a contract for the first phase of the Natural Gas Transportation and Processing Project. The scope of the agreement covered the welding and setting up of a 14 km subsea pipeline, as well as the fabrication and installation of one pipeline-end-terminal. Installation procedures started in late 2010 and all works were carried out by Technip's new pipe-laying vessel, Apache II.⁶¹ In early 2012, Technip completed the construction of the pipeline from the Jubilee Field. The pipeline will be connected to another, which will be used to transport natural gas from the Jubilee Field to a planned onshore processing plant.

Intecsea

Intecsea, a subsidiary of WorleyParsons, provided the FEED for an additional 36 km shallow pipeline from the Jubilee Field FPSO to an onshore site.⁶²

Sinopec

Sinopec, under an agreement with Ghana Gas, was made responsible for the EPC aspect of the Atuabo gas processing plant. The completion of the project is being fast-tracked with the initial aim of delivering gas for power production in Ghana in June or July 2014, with the target now shifted to September 2014.

SK Engineering & Construction

The Tema Oil Refinery hopes to boost its refining capacity from the current 45 Mbbl/d to 60 Mbbl/d by replacing old equipment by 2015.⁶³ In 1996, the USD 60 million Phase I modernisation project began. The upgrade was financed by a South Korean consortium led by the Samsung Corporation as the EPC contractor, with SK Engineering Company as its principal supplier.⁶⁴ In 1998, Tema Oil Refinery and Samsung agreed to undertake the USD 180 million Phase II project.

6.5.3 Downstream

The domestic consumption of oil and gas is limited in Ghana. Biomass fuels, such as firewood and charcoal, are the main source of energy for household needs.⁶⁵ In 2013, 43.6 per cent of electricity supplied by the Volta River Authority, the main generator and

61 "Technip to lay pipeline offshore Ghana," Pipelines International, 3 November 2010. <http://pipelinesinternational.com/news/technip_to_lay_pipeline_offshore_ghana/052175/#>.

62 2b1st Consulting, "Tullow approaches decision on Ghana TEN FPSO project," 21 March 2013. <<http://www.2b1stconsulting.com/tullow-approaches-decision-on-ghana-ten-fpso-project/>>.

63 Dontoh, E., "Tema Oil Refinery of Ghana Sees 33% Capacity Expansion by 2015," Bloomberg, 16 September 2013. <<http://www.bloomberg.com/news/2013-09-16/tema-oil-refinery-of-ghana-sees-33-capacity-expansion-by-2015.html>>.

64 MBendi, Oil Refining in Africa – Overview. <<http://www.mbdendi.com/indy/oilg/ogrf/af/gh/p0005.htm>>.

65 US Energy Information Administration, Ghana, August 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=GH>>.

supplier of electricity in Ghana, was generated by thermal plants.⁶⁶

GE

The Takoradi Thermal Power Station, located 17 km east of Sekondi, utilizes two 110 MW GE Frame 9E gas turbines and generators, as well as one 110 MW steam turbine and generator.⁶⁷

In June 2013, GE signed a Memorandum of Understanding with the country's Government to build a 1,000 MW power plant.⁶⁸

ABB

ABB's activities in Ghana includes a USD 13 million contract from the Volta River Authority in Ghana to supply equipment to improve the management and control of the country's national power transmission network.⁶⁹ ABB were contracted to supply, deliver, install and commission a new (SCADA/EMS) Supervisory Control and Data Acquisition/Energy Management System and communications system.

6.6 Future opportunities for international suppliers

The key conclusions from the country analysis are as follows:

- Ghana is well-governed and administered. It is considered a good place to conduct business in.
- The basic infrastructure is comparatively well developed.
- Chinese investment and soft loans for infrastructure projects are re-paid by oil exports.
- The Jubilee Field is the major current producing oil field and the TEN project is the major oil field development. Ghana's oil blocks are mainly in the exploration and development phase.
- All natural gas is currently flared.
- The Tema refinery and another planned refinery are evidence of the growing domestic consumption of petroleum products.
- The mid- and downstream oil and gas sectors are under development. Ghana has a medium-sized domestic market which has potential to be exploited.
- Ghanaian local content law currently has a low minimum and the state participation

⁶⁶ Volta River Authority, Ghana's Power Outlook, May 2013. <http://vraghana.com/resources/others/power_outlook_may_2013.pdf>.

⁶⁷ Volta River Authority and Takoradi Thermal Power Station, Project proposal for implementation under the Kyoto Protocol – Clean development mechanism. <<http://cd4cdm.org/%5C/sub-Saharan%20Africa/Ghana/First%20National%20Workshop/Oil-GasSwitchPowerPlant.ppt>>.

⁶⁸ Sedzro, A., "General Electric To Build 1000MW Power Plant In Ghana," Ventures Africa, 20 June 2013. <<http://www.ventures-africa.com/2013/06/general-electric-to-build-1000mw-power-plant-in-ghana/>>.

⁶⁹ "ABB wins \$13 million power order in Ghana," ABB, 1 April 2010. <<http://www.abb.com/cawp/seitp202/29810c93447fa1dac12576f8002ad8bd.aspx>>.

is also low.

Many of the opportunities for international suppliers were set to be discussed at the 5th in Accra in April 2014.⁷⁰ We have identified the key opportunities for international manufacturers in Ghana to include:

- Supply the equipment for the exploration of the offshore greater Jubilee area, notably drilling wells
- Undertake feasibility studies and the execution of mid- and downstream gas projects
- Provide the necessary equipment to produce gas rather than flaring it
- Construction, renovation and maintenance of oil refineries
- Pipeline engineering and construction, especially gas pipelines
- Design and construction of a floating LNG terminal
- Construction and upgrading of gas-fired power stations
- Given the importance of Agriculture in the country, designing and constructing petrochemical and fertilizer plants
- Build regasification facilities in Cotonou harbour in Benin.

70 Ghana Summit. <<http://www.cwcghana.com/ghana-summit/>>.

7. Mozambique

7.1 Business environment

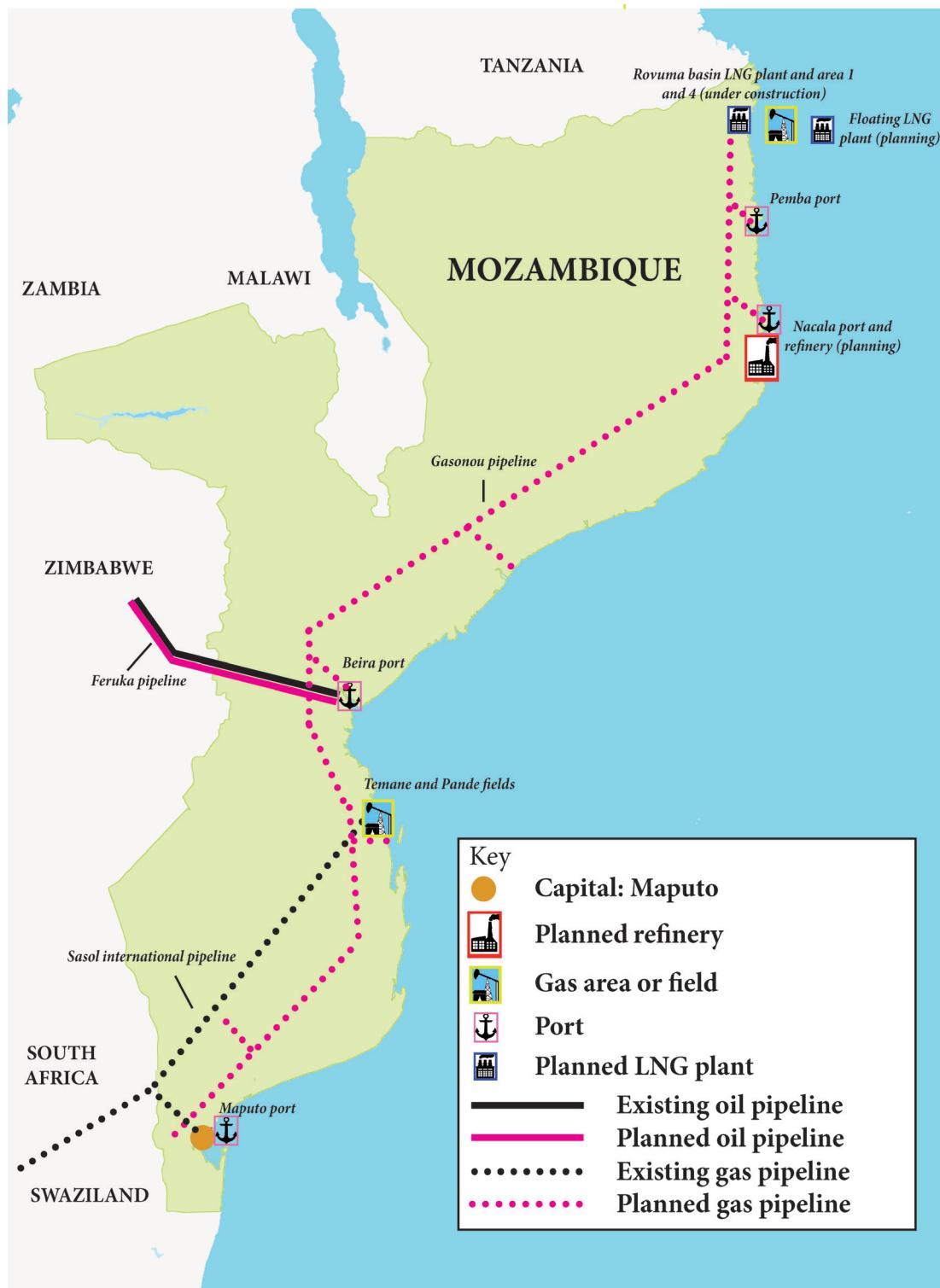
The Mozambican economy has experienced significant growth over the past two decades since the end of the civil war in 1992. Mozambique holds 4.5 tcf of proven natural gas reserves whilst holding no proven crude oil reserves (see Table 7.1 and Figure 7.1). The natural gas and coal resources have attracted large foreign investment. Due to its long coastline, Mozambique provides the gateway for neighbouring land-locked African nations to the global market. Further growth to the economy is therefore to be expected.

Table 7.1: Mozambique facts and figures

Capital	Maputo
Official language	Portuguese
Area	799,380 km ²
Population (2013 estimate)	24,096,669
Currency	Mozambique Metical
GDP (PPP) total (2013)	USD 28.15 billion
GDP (PPP) per capita (2013)	USD 1,200
GDP (official exchange rate) total (2013)	USD 14.67 billion
GDP (official exchange rate) per capita (2013)	USD 650
State Corruption Index (2013)	119 (out of 177)
Proven oil reserves (2013)	0
Proven natural gas reserves (2013)	4.5 tcf
Total oil production (2012)	0
Total natural gas production (2012)	153.8 bcf

Sources: Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/mz.html>>; US Energy Information Administration, Mozambique, August 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=MZ>>; Transparency International, "Corruption Perception Index 2013," December 2013. <<http://www.transparency.org/country#GNQ>>; OPEC, "OPEC Annual Statistical Bulletin 2013," July 2013. <http://www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB2013.pdf>.

Figure 7.1: Mozambique's major oil and gas activity and infrastructure



Base map from FreeVectorMaps.com
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7.1.1 Political stability and security

The improvement of human development in Mozambique did not take place until the middle of 1990s because of the preceding civil war, drought and sustained emigration. A UN-negotiated peace treaty marked the end of the civil war in 1992, after which the economic situation improved.

Between 12 and 24 native languages are spoken in Mozambique. Emakhuwa, the most common, is spoken only by one-quarter of the population. However, politically Mozambique's parties are not ethnically based. Most of the population can speak Portuguese which is the official language. The main divisions in Mozambique are economic and social, between rich and poor, and urban and rural rather than between ethnic groups.

The Mozambique Liberation Front (FRELIMO) is the ruling party in Mozambique led by President Armando Guebeza. The Economist political risk index ranks Mozambique as B, due to the recent riots and the potential for future disruption.¹ High levels of poverty combined with increasing costs of basic goods and services resulted in a riot in 2010. The Government was forced to implement subsidies, decrease taxes and institute other fiscal measures.² If clashes occur between government security forces and the main opposition party, Mozambican National Resistance (RENAMO), it will be disruptive to the political stability of the country when elections are held in 2014, but a return to civil war is unlikely. RENAMO, who lack human and financial resources, resumed dialogue with FRELIMO in January 2014 after RENAMO announced it would participate in the 2014 elections. President Armando Guebeza, is constitutionally prevented from running for a third term, however, his Defence Minister is set to succeed him as leader of FRELIMO.

Mozambique is an Elevated Risk Zone according to Travel Security Online.³ Bandit attacks and landmines pose dangers in the more remote areas. As of the end of 2013, military convoys needed to assist all traffic through the main north-south road between Save River and Muxungue.⁴ According to the authorities, at least 14 people, mostly wealthy Mozambicans of Asian origin, were kidnapped and held for ransom between 2011 and 2012. In early November 2013, two more people, a Portuguese citizen and the wife of an employee of an aid agency, were kidnapped.⁵ Analysts have suggested that the kidnappings stem from the instability in the country and are not directly related to RENAMO's recent resurgence.

Mozambique is ranked 119 out of 177 according to the corruption perception index in 2013.⁶ In 2010, there was a temporary suspension of aid by a number of international organisations due to corruption. Corruption is of great concern as international donors support nearly half of the state budget. Corruption raises the costs and risks of doing business in Mozambique as well as having negative consequences for the broader political and business climate. The anti-corruption agencies, particularly the Central Office for Combatting Corruption, lack both the technical expertise and financial resources, and

1 The Economist Intelligence Unit, Mozambique, 13 March 2014. <<http://country.eiu.com/mozambique>>.

2 African Development Bank, "Mozambique 2012," May 2012. <<http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Mozambique%20Full%20PDF%20Country%20Note.pdf>>.

3 Harvard University, Harvard Travel Assist, Mozambique, 8 November 2012. <<https://www.internationalsos.com/MasterPortal/default.aspx?content=landing&countryid=84>>.

4 Hanlon, J., "Mozambique: Renamo Escalates War, Killing 8 Soldiers & Attacking Health Post," AllAfrica, 7 November 2013. <<http://allafrica.com/stories/201311070922.html>>.

5 Jackson, J., "Mozambique's Renamo rejects peace talks," News 24, 6 November 2013. <<http://www.news24.com/Africa/News/Mozambique-Renamo-rejects-peace-talks-20131105>>.

6 Transparency International, "Corruption Perception Index 2013," December 2013. <<http://www.transparency.org/country#MOZ>>.

are too prone to political interference to tackle the scale of corruption in Mozambique. Corruption and bureaucratic inefficiency are key impediments to foreign investment in Mozambique. The first corruption-specific legislation was introduced in 2004 and the anti-corruption package was passed in 2011, however, corruption is likely to remain a challenge in the coming years.⁷ Specific to the natural resources found in the country, Mozambique committed to the Extractive Industry Transparency Initiative (EITI), which aims to improve state revenue by deterring tax evasion. Mozambique was considered to be EITI compliant yet, in reality, there is only minimal budgetary openness.⁸

7.1.2 Economy

Mozambique's GDP at official exchange rates was USD 14.67 billion, and per capita GDP was approximately USD 650 in 2012.⁹ Largely because of foreign direct investment in the extraction sector, the growth of the economy is strong at 7 per cent. High growth rates are set to continue over the next few years.¹⁰ Despite the recent trend of growth, the economy has failed to be restructured and has not significantly impacted employment creation or economic diversification. The economic growth has not resulted in a considerable reduction of poverty - over half of the population live under the poverty line. Mozambique was ranked 185 out of 187 in the UN's human development index in 2013.¹¹

Foreign investors are showing interest in Mozambique's untapped gas reserves, although reservations are caused by Mozambique's level of corruption. Foreign direct investment stood at USD 2.1 billion in 2011 and is set to significantly increase in the future. Currently, most of the natural gas produced is exported to South Africa via a pipeline. The expanding extractive industry could provide a way for the country to push itself into the middle income country bracket by 2025, as suggested in the Agenda 2025.¹² Coal and titanium are also a growing source of revenue.

7.1.3 Infrastructure

Mozambique's infrastructure ranking is 126 out of 148 in the World Economic Forum Global Competitiveness Report 2013-2014.¹³ Mozambique performs poorly in the rankings for most factors related to infrastructure with the exception of the quality of their rail transport. The east-west rail transport network is well developed but it is not the case for the north-south rail transport network.¹⁴ For the size of the country, they have very few roads with only 30,000 km of roads. However, infrastructure has improved

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- 7 U4 Anti-Corruption Resource Centre, "Overview of corruption and anti-corruption in Mozambique," April 2012. <<http://www.u4.no/publications/overview-of-corruption-and-anti-corruption-in-mozambique/>>.
 - 8 Spring, A. and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.
 - 9 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/mz.html>>.
 - 10 African Economic Outlook, "Mozambique – African Economic Outlook," 6 September 2013. <<http://www.africaneconomicoutlook.org/en/countries/central-africa/Mozambique/>>.
 - 11 United Nations, "Human Development Report 2013," 14 March 2013. <<http://hdr.undp.org/sites/default/files/Country-Profiles/MOZ.pdf>>
 - 12 African Economic Outlook, Mozambique, 6 September 2013. <<http://www.africaneconomicoutlook.org/en/countries/southern-africa/mozambique/>>.
 - 13 World Economic Forum, "Global Competitiveness Report 2013-2014," 3 September 2013. <http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf>.
 - 14 Dominguez-Torres, C. and Briceno-Garmendia, C., "Mozambique's Infrastructure: A Continental Perspective," World Bank Policy Research Working Paper Series, November 2011. <<http://elibrary.worldbank.org/doi/book/10.1596/1813-9450-5885>>.

considerably in recent years owing to the growing economic opportunities in the country and wider region. The transportation infrastructure in particular is being rebuilt using both private and public funding. Extensive construction and renovation are underway for ports, the rail system and the road network.¹⁵

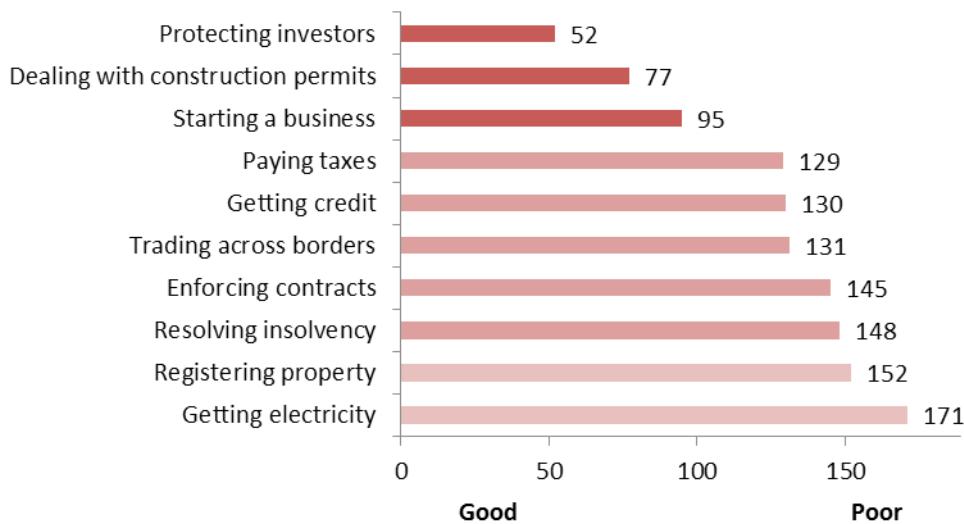
In 2011, only 20 per cent of Mozambique's population had access to electricity.¹⁶ Yet electricity consumption rate per capita is relatively high at 425 kWh.¹⁷ Expansion of the hydroelectric power capacity in Mozambique is needed to meet the increasing demand, such as the planned 1500 MW Mphanda Nkuwa hydropower project.

The commercial exploitation of the oil and gas resources is not expected before 2019 as improvements to the infrastructure are required.¹⁸

7.1.4 Operating in Mozambique

Mozambique is close to the average for a sub-Saharan nation in relation to the ease of doing business. Mozambique is ranked 139 out of 189 countries in the world (See Figure 7.2).

Figure 7.2: Ease of doing business rankings for Mozambique



Note: Countries are ranked from 1 to 189, with 1 as the best and 189 as the most difficult.

Source: Doing Business, "Doing Business 2014. Economy Profile: Mozambique," 29 October 2014.

<<http://www.doingbusiness.org/~media/giawb/doing%20business/documents/profiles/country/MOZ.pdf>>.

Obtaining electricity, registering property and enforcing contracts are some of the

15 KPMG, Mozambique Country Profile, 2012. <<http://www.kpmg.com/Africa/en/KPMG-in-Africa/Documents/Mozambique.pdf>>.

16 The World Bank, Access to Electricity, 2013. <<http://data.worldbank.org/indicator/EG.ELC.ACCTS.ZS>>.

17 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/mz.html>>.

18 African Development Bank, Mozambique Economic Outlook, May 2013. <<http://www.afdb.org/en/countries/southern-africa/mozambique/mozambique-economic-outlook/>>.

tougher aspects of doing business in Mozambique. Mozambique is far behind the sub-Saharan norm for electrification, rendering it difficult and costly to obtain a reliable power supply. The registering of property in Mozambique takes over five weeks and costs 8 per cent of the value of the property. The legal procedures for contract enforcement in Mozambique take about three years and cost 120 per cent of the value of the claim, hence it is inefficient and unprofitable to try to resolve commercial disputes in the Mozambican courts.

Mozambique functioned as a socialist economy in its first decade after independence in 1974, and the Constitution does not allow private ownership of land. Land can only be leased, although for renewable 50-year periods.¹⁹

Mozambique is very close to the Sub-Saharan Africa average price and efficiency regarding taxation, whilst importing and exporting from Mozambique are better than average among the sub-Saharan African nations. The significant advantage of Mozambique over the South African ports is that export and import costs are lower. A USAID support programme recently provided Mozambique with technical assistance to help simplify the permit process thus making it significantly easier to obtain construction permits.

Most companies find it advantageous to establish a local office in Mozambique to assist in communicating with local officials and clients. At a minimum, this involves registration with three ministries: the Ministry of Industry and Commerce, the Ministry of Planning and Development and the Ministry of Finance.²⁰

7.2 Resources and Infrastructure

7.2.1 Oil

As of 2014, Mozambique does not hold any proven crude oil reserves. A very small-scale oil production of approximately 2 Mbbl/d is due to start in 2014. Exploration wells will be drilled deeper than the wells drilled thus far in the hope of discovering more oil.²¹

Mozambique however does have considerable onshore and offshore sedimentary basins that contain natural gas resources, much of which remain unexploited.²² Gas reserves and production in Mozambique will be discussed in the following sections.

19 US Commercial Service, "Doing Business in Mozambique: A Country Commercial Guide for US Companies," 2005. <<http://www.tourisminvest.org/Mozambique/downloads/Investment%20climate%20background/General/Country%20Commercial%20Guide%20chapter%206%20-%20Investment%20Climate.pdf>>.

20 Ibid.

21 "Mozambique due to become oil producer in 2014," Macau Hub, 6 January 2014. <<http://www.macauhub.com.mo/en/2014/01/06/mozambique-due-to-become-oil-producer-in-2014/>>; Gismatullin, E., "Oil Hunted in Mozambique After World's Largest Gas Discoveries," Bloomberg, 14 June 2013. <<http://www.bloomberg.com/news/2013-06-14/oil-hunted-in-mozambique-after-world-s-largest-gas-discoveries.html>>.

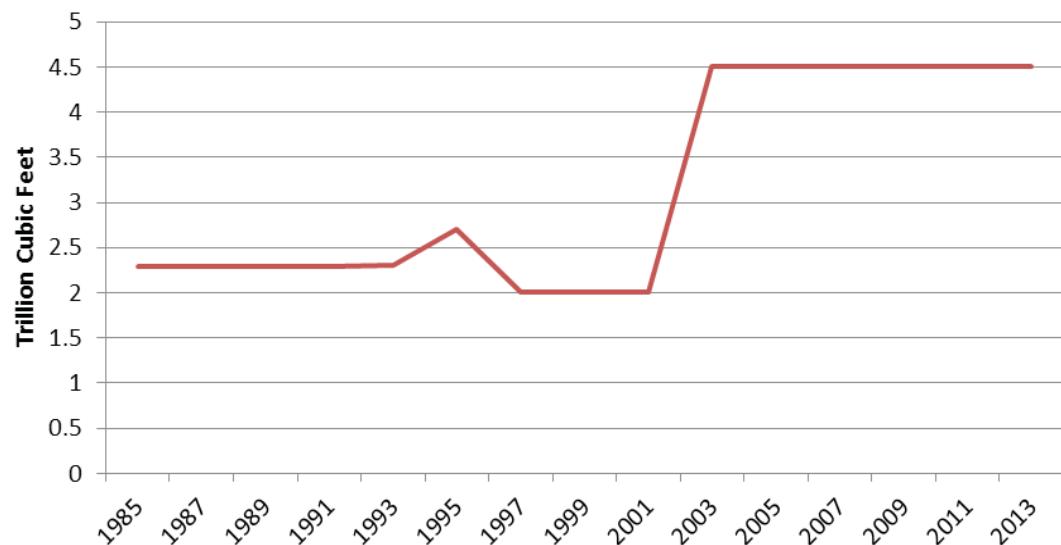
22 US Energy Information Administration, Mozambique, April 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=MZ>>.

7.2.2 Gas

Reserves

Proven gas reserves in Mozambique doubled from 2.2 tcf in 1984 to 4.5 tcf in 2013 (see Figure 7.3). Resource estimates are likely to increase dramatically as appraisal drilling and reserve certification continues. A recent study by the US Geological Survey predicted that the four geological provinces along the east coast of Africa, much of which falls in Mozambican territory, could contain as much as 440 tcf of natural gas, over double of Nigeria's current proven reserves. The four provinces are predicted in addition to contain 27.6 billion bbl of oil and a further 13.77 billion bbl of natural gas liquids.²³

Figure 7.3: Mozambique proven natural gas reserves (1985-2013)



Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

Table 7.2 indicates discoveries which were made in 2010 in Mozambique. The Rovuma basin offshore north (Areas 1 and 4), are considered large enough to support LNG projects. Area 1 includes the Golfinho/Atum Complex and the Prosperidade Complex, which also straddles Area 4. Area 4 includes the Coral and the Mamba Complexes.²⁴ For the complexes that overlap Area 1 and Area 4 (Prosperidade and Mamba Complexes), a joint development, or unitisation, of reserves under separate licenses is required by Mozambican law.²⁵ Areas 2, 3, 5 and 6 are all currently being explored.

23 US Geological Services, Assessment of Undiscovered Oil and Gas Resources for Four East Africa Geological Provinces, April 2012. <<http://pubs.usgs.gov/fs/2012/3039/contents/FS12-3039.pdf>>.

24 US Energy Information Administration, "Emerging East Africa Energy Analysis Brief," 23 May 2013. <<http://www.eia.gov/countries/regions-topics.cfm?fips=eeae>>.

25 Ibid.

Table 7.2: Known and estimated conventional gas resources in Mozambique

Region name	Total assessed (tcf)	Discovered (3P tcf)	Estimated undiscovered (3P tcf)
Rovuma offshore north	199.4	124.4	75.0
Rovuma offshore south	36.0	0.0	36.0
Rovuma onshore	3.1	0.0	3.1
Central offshore	17.9	0.0	17.9
South offshore	13.1	0.0	13.1
Maniamba basin onshore	1.2	0.0	1.2
South and west onshore	9.2	3.5	5.7
Total	279.9	127.9	152.1

Note: 3P is defined as proven plus probable plus possible resources.

Source: US Energy Information Administration, "Emerging East Africa Energy Analysis Brief," 23 May 2013. <<http://www.eia.gov/countries/regions-topics.cfm?fips=eeae>>; ICF International Natural Gas Master Plan, Draft Report Presentation, September 2013. <<http://www.mirem.gov.mz/relatorios/stakeholder-workshop.pdf>>.

A reserve called the Prosperidade Complex contains an estimated 17 to 30 tcf, and the reserve called Golfinho Complex contains an estimated 15 to 35 tcf of recoverable natural gas resources.²⁶ Eni's natural gas discoveries in the Mamba and Coral Complexes contain 62 tcf and 13 tcf respectively (see Table 7.3). The Rovuma basin natural gas discoveries, which include the Prospeidade and Golfinho Complexes, are larger than the North Sea fields, and represent the largest discovery in the past decade. The development of these resources by various foreign companies, together with the development of rail and port infrastructure, could result in a sufficient increase in LNG exports to make Mozambique the world's third leading LNG exporter.²⁷

26 US Energy Information Administration, Mozambique, April 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=MZ>>.

27 Baobab Resources, Unlocking the iron & steel wealth of Mozambique, June 2013. <<http://www.baobabresources.com/files/Baobab201306.pdf>>.

Table 7.3: Recent offshore natural gas discoveries in Mozambique

Area	Well	Discovery Date	Recoverable Gas Resources	Recoverable and non-recoverable gas
Prosperidade Complex Operated by Anadarko				
Area 1	Windjammer	Feb 2010	17-30 tcf	N/A
Area 1	Barquentine-1	Oct 2010		
Area 1	Lagosta-1	Nov 2010		
Area 1	Tubarao	Feb 2011		
Area 1	Barquentine-2	Aug 2011		
Area 1	Camarao	Oct 2011		
Area 1	Barquentine-3	Nov 2011		
Area 1	Lagosta-2	Jan 2012		
Area 1	Lagosta-3	Feb 2012		
Area 1	Barquentine-4	Apr 2012		
Golfinho/Atum Complex Operated by Anadarko				
Area 1	Golfinho-1	May 2012	15-35 tcf	N/A
Area 1	Atum	June 2012		
Area 1	Golfinho-2	July 2012		
Mamba Complex operated by Eni				
Area 4	Mamba South-1	Oct 2011	N/A	62 tcf
Area 4	Mamba North	Feb 2012		
Area 4	Mamba Northeast-1	Mar 2012		
Area 4	Mamba Northeast-2	Aug 2012		
Area 4	Mamba South-2	Dec 2012		
Coral Finds Operated by Eni				
Area 4	Coral-1	May 2012	N/A	13 tcf
Area 4	Coral-2	Dec 2012		
Area 4	Coral-3	Feb 2013		

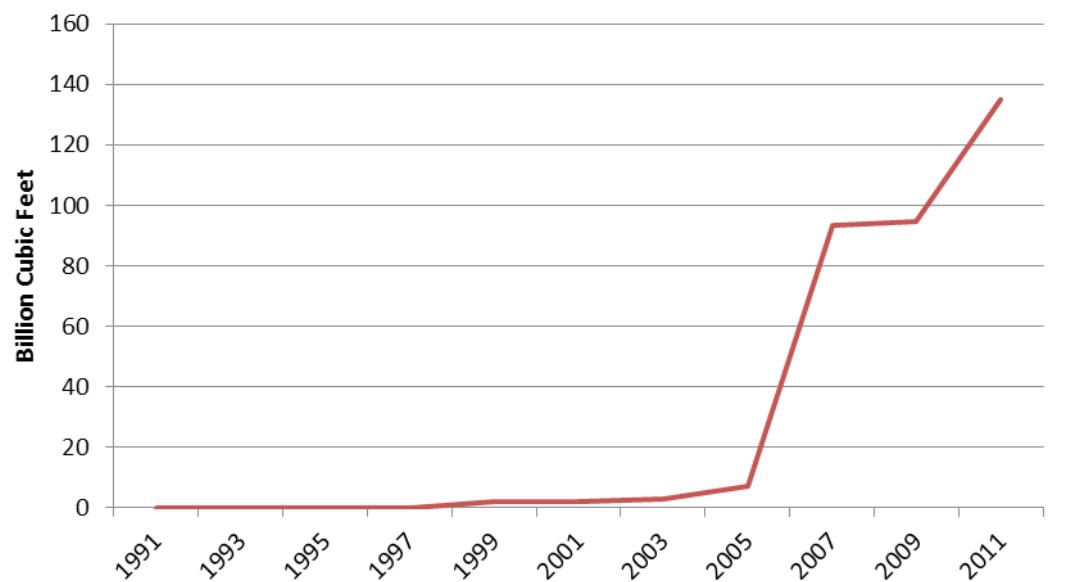
Note: The resource estimates are likely to change as appraisal drilling continues and reserve certification is completed. Source: US Energy Information Administration, "Emerging East Africa Energy Analysis Brief," 23 May 2013. <<http://www.eia.gov/countries/regions-topics.cfm?fips=eeae>>.

Production

Mozambique and Tanzania are currently the only two East African countries that produce natural gas. Production of natural gas in Mozambique has increased dramatically in the last two decades. The country did not produce any natural gas in 1990, and by 1998 the production level was only 2.1 bcf/a. By 2011, however, Mozambique was producing 134.9 bcf/a of natural gas (see Figure 7.4). The country's production is currently limited to its onshore fields, operated by South African company Sasol.²⁸ This can be expected to change as Anadarko and Eni's offshore fields come on-stream: more than 70 per cent of the country's gas reserves are estimated to be held in the Rovuma offshore north region, where these fields are located.²⁹

Control Risks reported in 2012 that the success rate of companies prospecting for offshore gas in the region as a whole has been fairly high, with 24 discoveries in 27 drilled wells in Mozambique and Tanzania.³⁰ According to the National Petroleum Institute (INP), 97 exploration and appraisal wells had been drilled in Mozambique by 2011.³¹ More appraisal and exploratory drilling is planned, with many companies introducing third party companies into the exploration to reduce the risk.

Figure 7.4: Mozambique gross natural gas production (1991-2011)



Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

28 US Energy Information Administration, "Emerging East Africa Energy Analysis Brief," 23 May 2013. <<http://www.eia.gov/countries/regions-topics.cfm?fips=eeae>>.

29 Ibid.

30 Control Risks, "A New Frontier: Oil and Gas in East Africa," 2012. <http://www.controlrisks.com/Oversized%20assets/east_africa_whitpaper_LR_web.pdf>.

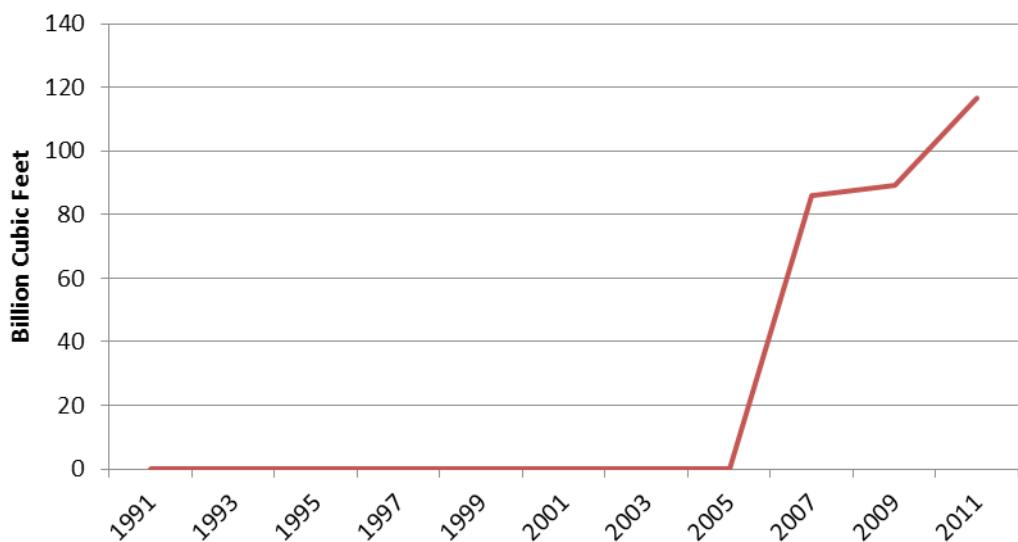
31 National Petroleum Institute, Exploration & Production. <<http://www.inp.gov.mz/Exploration-Production>>.

Exports

Mozambique exports almost all of the natural gas it produces. As recently as 2005, it was exporting no natural gas at all. Eight years later, however, the country exported just under 120 bcf/a, 86.4 per cent of its total production in 2011.³² The correlation between natural gas production and natural gas exports in Mozambique is clear from Figure 7.4 and Figure 7.5.

Natural gas is mostly exported to South Africa via the 535 mile Sasol International Gas Pipeline. In addition to the Sasol International Gas Pipeline, the proposed LNG plant at Rovuma is expected to expand the export capacity of the country significantly (see Section 7.2.4).³³ Following the fifth Tokyo International Conference on African Development in 2013, Japanese Prime Minister Shinzo Abe visited Mozambique, Ethiopia and Ivory Coast in January 2014. Mozambique is an attractive prospect for the Asian market with Japan set to have high level talks with Mozambique in mid-2014. Anadarko have signed a long-term contract to sell two thirds of LNG made at the Rovuma LNG plant to Asian buyers.³⁴ The disadvantage of Australian LNG for Asia is the high development costs, whereas the US has low development costs but is further away from Asia-Pacific as Australian LNG plants are located on the north coast, whereas the majority of US LNG plants are located in the Gulf of Mexico. Mozambique and Tanzania are a strong compromise with an expected large quantity of clean gas requiring no separation available and in sufficient proximity to Asia and the Far East.³⁵

Figure 7.5: Mozambique exports of dry natural gas (1991-2011)



Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

32 US Energy Information Administration, Mozambique, April 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=MZ>>.

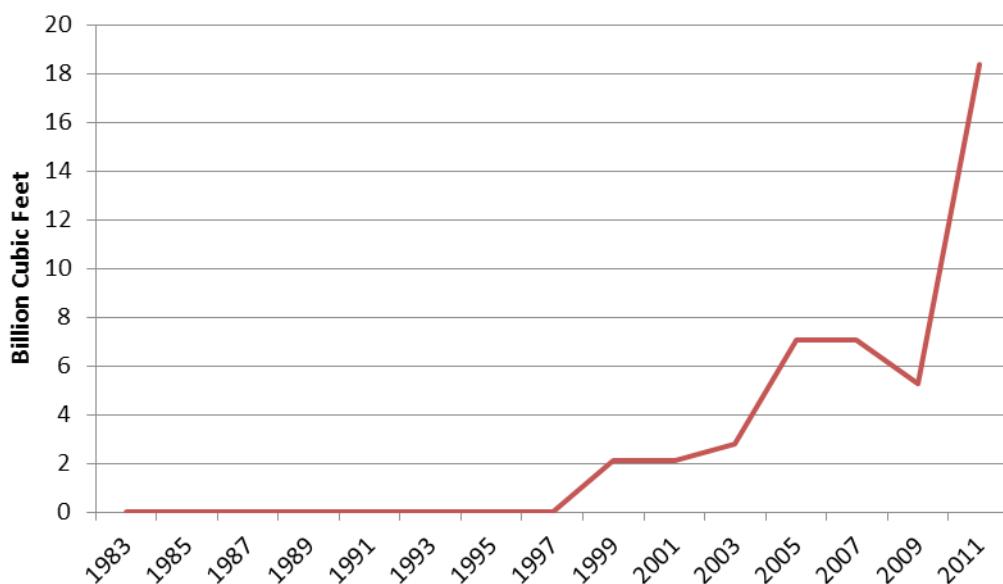
33 Ibid.

34 "Anadarko Signs Supply Contracts With Asian Buyers, Defining Clearer Investment Plans For Mozambique LNG," Forbes, 31 March 2014. <<http://www.forbes.com/sites/greatspeculations/2014/03/31/anadarko-signs-supply-contracts-with-asian-buyers-defining-clearer-investment-plans-for-mozambique-lng/>>.

35 Ledesma, D., "East Africa Gas – Potential for Export," The Oxford Institute for Energy Studies, March 2013. <<http://www.oxfordenergy.org/wpcms/wp-content/uploads/2013/03/NG-74.pdf>>.

Domestic consumption of natural gas remains relatively low and the majority of the population remains dependent on traditional biomass and waste, mostly wood, for heating and cooking. Only 20 per cent of Mozambique's population had access to electricity as of 2011.³⁶ Consumption of dry natural gas has increased over the past 10 years from 2.8 bcf in 2001 to 18.36 bcf in 2011, which was around 14 per cent of natural gas production. Industry requests for natural gas are given in Table 7.4. The amount of natural gas requested outstrips the current level of production; hence the commissioning of the projects depends upon Mozambique increasing production.

Figure 7.6: Mozambique dry natural gas consumption (1983-2011)



Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

Table 7.4: Industry gas supply requests

Project	Country	Location	Quantity (bcf/a)	Project duration (years)
Gas-to-liquids	South Africa	Palma, Rovuma	93.6	25
Methanol	Japan	Palma, Rovuma	25.3	20
Methanol	India	Palma, Rovuma	42.4	30
Methanol	Germany	Palma, Rovuma	468.1	25
Methanol	Japan	Palma, Rovuma	N/A	N/A
Methanol	South Korea	Palma, Rovuma	N/A	N/A

36 The World Bank. Access to Electricity, 2013. <<http://data.worldbank.org/indicator/EG.ELC.ACCE.ZS>>.

Fertilizer	Norway	Palma, Rovuma	25.3	25
Fertilizer	Japan	Beira	10.8	20
Fertilizer	Germany	Palma, Rovuma	28.9	20
Electricity	Various	Palma, Rovuma	54.9	30
LPG	South Africa	Palma, Rovuma	0	20
Pipeline	Mozambique	Mozambique	42.4	25
Total			791.7	

Source: "Natural Gas Master Plan for Mozambique: Draft Report Executive Summary," ICF, 26 August 2012.

7.2.3 Oil and gas infrastructure

Mozambique's Feruka petroleum products pipeline runs from Beira to the Zimbabwean capital, Harare, passing through the now closed Feruka oil refinery. This allows land-locked Zimbabwe to import oil. A parallel pipeline is under consideration to increase capacity and reach other nearby countries (see Section 1.2.4).

Mozambique exports most of the natural gas it produces to South Africa via the 535-mile Sasol Petroleum International Gas Pipeline.³⁷ The Matola Gas Company, which operates the downstream processes on behalf of the Empresa Nacional de Hidrocarbonetos (ENH), has built 100km of distribution pipeline to serve the Matola region of the country, which could increase the domestic consumption of gas.³⁸ However, the country's mid-and downstream infrastructure is otherwise underdeveloped.

7.2.4 Planned oil and gas projects

Much of the activity in Mozambique's gas sector is still in the appraisal phase, and only the onshore fields operated by Sasol are currently producing gas. Statoil operates offshore Areas 2 and 5, and Petronas Areas 3 and 6, where they are undertaking appraisal operations. The next major developments will be Anadarko and Eni's operations in the offshore Rovuma basin.

Exploration activity is also taking place in the Mozambique basin, south of the Rovuma basin. Three new discoveries were made during the exploration drilling in the Pande, Temane and Inhassoro area.³⁹ The country's next leasing round will take place in the course of 2014.⁴⁰ Table 7.5 summarises some of the upcoming midstream and downstream projects planned in Mozambique.

³⁷ US Energy Information Administration, Mozambique, April 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=MZ>>.

³⁸ Matola Gas Company, Gas Distribution. <<http://www.mgc.co.mz/pt/actividades/gasoduto/distribuicao-de-gas/>>.

³⁹ Republic of Mozambique, National Petroleum Institute, Exploration Activities. <<http://www.inp.gov.mz/News-Events/Mozambique-Basin>>.

⁴⁰ "Mozambique to start fifth oil and gas blocks auctions in 2014," Oil Review Africa, 28 November 2013. <<http://www.oilreviewafrica.com/exploration/exploration/mozambique-set-for-fifth-oil-and-gas-auctions-in-2014>>.

Table 7.5: Planned mid- and downstream oil and gas projects in Mozambique

Project	Capacity	Start up	Sector	Operator
Rovuma LNG plant	20 MMtpa	2018-2020	Upstream and midstream	Anadarko
Area 4	N/A	2017	Floating LNG facility	ENI
Gasonou pipeline	42.4	N/A	Gas pipeline	N/A
Matola pipeline	N/A	2014	Gas pipeline	ENH
Beira oil pipeline	N/A	N/A	Oil pipeline	Mining Oil and Gas Services
Ressano Garcia power plant	150 MW	2014	Gas-fired power plant	EDM
Maputo power plant	100 MW	2018	Gas-fired power plant	N/A

Source: see text below

Rovuma LNG Plant

Rovuma LNG Plant is a joint venture in Mozambique between Anadarko, Eni, Statoil, and ENH, concerned with LNG production and export. ICF International, a consulting firm, was commissioned by the World Bank and the Government of Mozambique to undertake a variety of studies to develop the Natural Gas Master Plan, the draft of which it produced in 2012.⁴¹ This has led to the Rovuma LNG plant project, located at Afungi Park in the Cabo Delgado province close to the Rovuma Basin and Palma, which aims to extract and transport the gas from wells via a 45 km network of offshore pipelines to the onshore LNG facility. Initially the Mozambique LNG plant will consist of four 5 MMtpa liquefaction trains with expansions scheduled to increase the capacity up to 50 MMtpa. It will be one of the largest LNG investments in the world this decade, amounting to at least USD 50 billion.⁴² The three main elements of the project are:

- Offshore - drilling of wells and installation of pipelines on the seafloor to connect the wells and then bring the natural gas to the shore.
- Near Shore - construction of a multi-purpose dock and jetties. The dock will house support vessels and allow for equipment and material (for onshore construction) to be brought ashore. LNG carriers will berth at the jetties while they are filled with LNG.
- Onshore - construction and operation of the LNG Facility and all associated

41 US Energy Information Administration, "Emerging East Africa Energy Analysis Brief," 23 May 2013. <<http://www.eia.gov/countries/regions-topics.cfm?fips=eeae>>.

42 Anadarko, Planned Mozambique LNG Project. <<http://www.anadarko.com/Operations/Pages/LNGproject.aspx>>; ICF, ICF International Natural Gas Master Plan, Draft Report Presentation, September 2013. <http://www.mirem.gov.mz/relatorios/stakeholder_workshop.pdf>.

infrastructure, such as housing, construction camp, airport etc.

Construction will occur in phases, with construction of the first train due to commence in Q1 2014. The total duration of design, construction and commissioning of the first LNG train will be 51 months from sanction (see Section 7.5.1). Although the start of production is officially estimated for 2018, there is speculation that constructing the necessary infrastructure may delay initial LNG production until 2020.⁴³ This is especially problematic given that other gas producers, such as the US and Australia, are set to become major players in the next five years.⁴⁴ The US is expected to start exports of LNG in 2015 and by 2016 Australia is forecast to export approximately 3 tcf of LNG.⁴⁵ Mozambique may not be able to develop their potential before supply outgrows demand which will pull down the price of gas.

Floating LNG Facility

Eni has submitted plans for a floating LNG facility in Area 4.⁴⁶ The gas would most likely be shipped to India and other Asian countries. One of the advantages of a floating LNG facility is that it can be constructed in a high quality shipyard rather than dealing with the infrastructure challenges posed by onshore constructions.

Gasonou Pipeline

A 2,600 km natural gas pipeline, costing USD 5 billion, is being considering which would run from the north of Mozambique to the capital city Maputo in the south where it could be extended to run to South Africa. The pipeline is expected to take two years to construct.

A feasibility study is currently underway for the pipeline, which should be presented in early 2014.⁴⁷ However, the pipeline does not appear to be a priority for the South African Government whose 20 year draft energy plan ignores the Rovuma basin, perhaps because of the required distance of the pipeline and cost of transportation of LNG. In contrast, the Japanese Government has moved quickly to try to sign agreements on the Rovuma basin natural gas, decreasing the likelihood of the pipeline's construction as the natural gas will be exported to Japan.⁴⁸ VGI Consulting was appointed to assist with the route engineering and pipe design and sizing. The suggested route of the pipeline is shown in Figure 7.1.

43 US Energy Information Administration, "Emerging East Africa Energy Analysis Brief," 23 May 2013. <<http://www.eia.gov/countries/regions-topics.cfm?fips=eeae>>.

44 Gloystein, H. and Vukmanovic, O., "Bigger battle awaits Mozambique, Tanzania in East Africa gas race," Financial Post, 10 October 2013 <http://business.financialpost.com/2013/10/10/bigger-battle-awaits-mozambique-tanzania-in-east-africa-gas-race/?_lsa=787a-ebdc>.

45 Ibid.

46 HIS, "Mozambique – Political dynamics, regulatory outlook and infrastructure risks," 2012. <http://macua.blogs.com/files/exclusive-analysis_africa_moz.pdf>; US Energy Information Administration, "Emerging East Africa Energy Analysis Brief," 23 May 2013. <<http://www.eia.gov/countries/regions-topics.cfm?fips=eeae>>.

47 Moolman, S., "Feasibility study under way for \$5bn Mozambique gas pipeline," Engineering News, 20 September 2013. <<http://www.engineeringnews.co.za/article/feasibility-study-under-way-for-5-billion-moz-based-gas-pipeline-2013-09-20>>.

48 Smith, N., "SA 'ignores' vast Mozambique gasfield," Business Day live, 20 January 2014. <<http://www.bdlive.co.za/business/energy/2014/01/20/sa-ignores-vast-mozambique-gasfield>>.

Matola Pipelines

The project was a partnership between Mozambique's National Hydrocarbon Company, ENH and Korean Kogas. Work is 60 per cent complete on gas pipelines running from the city of Matola to the Maputo thermal power station, while the distribution network will take the form of a ring nearly 60 km long, serving some of Maputo's urban district. The project should be finished in June 2014.⁴⁹ Despite this, it has been reported that Kogas is considering leaving natural gas exploration in the Rovuma Basin, and in other countries, by selling its assets due to the high level of debt it has.

Ressano Garcia gas-fired power plant

A gas-fired power station, capable of generating 150 MW, could come on stream in May 2014 with construction already complete. Ressano Garcia is close to the border between Mozambique and South Africa. It is being installed by a partnership between the Mozambican electricity company, EDM, with 51 per cent of the project, and the South African Sasol New Energy, part of the Sasol group, with 49 per cent. Its cost is estimated at USD 250 million.⁵⁰

Maputo combined-cycle gas-turbine power plant

The Japanese Government is to grant Mozambique a loan of JPY 17.27 billion (USD 167 million) to build a combined-cycle gas-turbine power station in Maputo. The power plant will generate 100 MW. Work on the power plant is planned to be finished in 2018.⁵¹

Beira oil pipeline

Mining Oil and Gas Services, a South African-based company, intends to construct a multi-billion-dollar fuel pipeline linking Beira in Mozambique and three Southern African countries, namely Botswana, Zambia and the Democratic Republic of Congo, via Zimbabwe. The pipeline will be available for use by any trader following the approval of the various governments of the countries through which the pipeline runs. The pipeline will run parallel with the Feruka oil pipeline linking Beira and the Msasa fuel depot in Harare and will have capacity to move 500 million litres of fuel per month. Once approvals are obtained from the Government of Zimbabwe, the construction of the section between Harare and Beira is estimated to take between 18 and 24 months.⁵²

Nacala oil refinery

The Nacala oil refinery is currently in the planning stages. Land concession has already been granted. The Mozambican Government plans to construct a 300 Mbbl/d oil refinery worth USD 5 billion in the coastal district of Nacala that will be operational by 2015. The refinery will be constructed in modules of 33 Mbbl/d, at USD 400 million each, and will

49 "Mozambique: Maputo Gas Pipeline 60 Per Cent Complete," AllAfrica, 10 January 2014. <<http://allafrica.com/stories/201401101331.html>>.

50 "Mozambique: New Power Station to Generate 150 Megawatts," AllAfrica, 6 August 2013. <<http://allafrica.com/stories/201308070321.html>>.

51 "Mozambique: Japan to Finance New Maputo Power Station," AllAfrica, 14 January 2014. <<http://allafrica.com/stories/201401140941.html>>.

52 Kadzere, M., "Pipeline to link Beira, region," The Herald, 22 November 2013. <<http://www.herald.co.zw/pipeline-to-link-beira-region/>>.

provide refined products for the hinterland countries.⁵³ The project is being considered alongside the Beira oil pipeline. The plans for the proposed refinery were stalled in 2008 for financial reasons but renewed interest has been shown by a Saudi Arabian company.⁵⁴

7.3 Laws and regulations

Mozambique's mineral, oil and gas sectors are overseen by the Ministry of Mineral Resources (MIREM - Ministério de Recursos Minerais), which is overseen by the Council of Ministers (the nation's cabinet). The National Petroleum Institute (Instituto Nacional de Petróleo or INP) is the organisation charged with regulating the oil and gas sector at every level. MIREM, in practice, is the licensing authority, and holds high discretionary decision-making power. MIREM and INP were established in 2005 and 2004 respectively.⁵⁵

7.3.1 The Petroleum Law

A revision of Mozambique's 2001 Petroleum Law (Law No. 03/2001, 21st February 2001) was published by the Government in 2012, and was due to be ratified by parliament by the end of 2013.⁵⁶ As of May 2014, this ratification has not taken place but is expected to occur in the next parliamentary session.⁵⁷

The original 2001 law applies only to upstream petroleum operations, and its purpose is to establish the system by which the rights to petroleum operations are granted in Mozambique.⁵⁸ It grants exclusive ownership of all petroleum resources in the Mozambican territory to the State, and gives the Council of Ministers authority over them and their exploitation.⁵⁹ Private companies must therefore gain Reconnaissance Concession Contracts (RCC) for their initial exploration, which allows surveys to a depth no greater than 100 m. Further exploration may continue under the terms of an Exploration and Production Concession Contract (EPCC).⁶⁰ An EPCC allows for a maximum exploration period of eight years and a maximum production period of 30 years. The law also allows the Council of Ministers to approve discretionary modifications to the general tax regime for upstream operations.⁶¹

The proposed revision of 2012 mainly makes changes of minor importance to the 2001 law. One of the most significant changes, however, is that, under the revised law,

53 Apa, "Foreign firms line up for Mozambique refinery project," StarAfrica, 3 October 2013. <<http://en.starafrika.com/news/foreign-firms-line-up-for-mozambique-refinery-project.html>>.

54 "Mozambique's Nacala oil refinery project back on track," Oil Review Africa, 4 February 2013. <<http://www.oilreviewafrica.com/downstream/downstream/mozambique-s-nacala-oil-refinery-project-back-on-track>>.

55 Freshfields, "Mozambique Oil and Gas," March 2013. <http://www.freshfields.com/uploadedFiles/SiteWide/News_Room/Insight/Africa_ENR/Mozambique/Mozambique%20oil%20and%20gas.pdf>.

56 Boman, K., "Ratification of Mozambique Petroleum Law Seen By Year-End," Rigzone, 7 May 2013. <http://www.rigzone.com/news/oil_gas/a/126334/Ratification_of_Mozambique_Petroleum_Law_Seen_By_YearEnd>.

57 Energy Legal Blog, East Africa Licensing Update, 19 May 2014. <<http://www.energylegalblog.com/archives/2014/05/19/5544>>.

58 Republic of Mozambique, Petroleum Law 3/2001, §2.2, §3. <<https://www.inp.gov.mz/en/content/download/100/367/file/Petrlaw-eng-promulgatedversion-21feb014.pdf>>.

59 Ibid. §§§ 6, 7 & 10.

60 Ibid. §12.

61 Deloitte, "The Deloitte Guide to Oil and Gas in East Africa," January 2013. <<http://www.deloitte.com/assets/Dcom-Kenya/Local%20Assets/Documents/The%20Deloitte%20Guide%20to%20oil%20and%20gas%20in%20East%20Africa.pdf>>

companies must be registered in Mozambique in order to hold an EPCC, or to hold interest in petroleum operations. This registration can be made either through a Mozambican subsidiary or an office in the country.⁶²

7.3.2 The “Mega-Projects” Law

The “Mega-Projects” Law (Law No. 15/2011, 15th August 2011) obliges mining, oil and gas investors to make between 5 per cent and 20 per cent of the equity in project companies involved in activities in Mozambique available to the Mozambican public.⁶³ The Deputy Minister of Natural Resources clarified that in order to achieve the sales of equity, the strategy is for public Mozambican companies to buy the required percentage of equity and then those Mozambican companies will put their shares on the Mozambican stock market to be bought by local Mozambican businesses and people.⁶⁴

7.3.3 Local content law

There is as of yet no formal local content policy in Mozambique. The current Petroleum Law (Law 3/2001) states that companies need to “give preference to Mozambican products and services whenever they are competitive in terms of price and comparable in terms of quality and supply”. However, no specific targets or means were provided to measure this. The same law also stipulates that Mozambican individuals must be given preference in the tender of oil and gas licences.

Article 20.4 of the revised Petroleum Law draft introduces a compulsory preference for Mozambican content of comparable quality to imported content, provided its price is no more than 10 per cent higher than the imported content.⁶⁵ Local content requirements also form part of Decree 24/2004 on Petroleum Operations Regulations, which mandates that contracts for the procurement of goods and services be awarded on an internationally competitive basis. Article 38 in particular mandates that operators must “give preferential treatment to the purchase of local goods and services when such goods and services are internationally comparable in terms of quality, availability, and quantity required and are offered at prices inclusive of taxes not higher than 10 percent of the available imported goods.”⁶⁶

Article 38 of Decree 24/2004 is the first binding clause requiring extractive companies to source goods locally. Nevertheless, the supply caveats are sufficiently loose to be circumvented, and there are no local sourcing targets set, or requirements for joint ventures with Mozambican companies. Table 7.6 details other laws with a bearing on local content in the oil and gas sector.

62 Ibid.

63 KPMG, Mozambique Country Profile, 2012. <<http://www.kpmg.com/Africa/en/KPMG-in-Africa/Documents/Mozambique.pdf>>.

64 Mussili, P., “Extractive industry: The goal is to give an edge to Mozambicans - Noormahomed,” The Africa Report. <<http://www.theafricareport.com/Interview/extractive-industry-the-goal-is-to-give-an-edge-to-mozambicans-noormahomed.html>>.

65 USAID, “Policy Options for Strengthening Local Content in Mozambique,” September 2013. <<http://www.speed-program.com/wp-content/uploads/2013/10/2013-SPEED-Report-010-Policy-Options-for-Strengthening-Local-Content-in-Mozambique-EN.pdf>>.

66 The World Bank, “Local Content Policies in the Oil and Gas Sector,” July 2013. <<http://issuu.com/world.bank.publications/docs/9780821399316/59>>.

Table 7.6: Relevant local content laws in Mozambique

Law/Decree	Remarks
Mega Projects/ PPP Law (Law No. 15/2010)	This law requires that any investment above USD 500 million has a positive effect on small and medium Mozambican enterprises. However, it lacks any clear guidance or regulatory overseeing.
New Labour Law (Law No. 23/2007)	This law established conditions for employment of migrant or foreign workers in Mozambique, as well as restrictions and limitations on the employment of foreign workers. The law obliges employers to create conditions for placing qualified Mozambicans in more highly skilled jobs and in positions of management and administration of enterprises. It also allows the State to reserve certain functions or activities exclusively for its citizens that are within the range of those whose fulfilment by foreigners is contrary to the public interest.
Decree No. 63/2011	<p>In this decree, the Ministry of Labour introduced new quotas for employing foreigners in the extractive industries as follows:</p> <ul style="list-style-type: none"> • 5 per cent of the total number of employees in large enterprises (over 100 employees) • 8 per cent of the total number of employees in medium sized enterprises (more than 10, less than 100 employees) • 10 per cent of total number of employees in small enterprises (companies employing up to 10 people).

Source: see text above and below table

The Labour Law provided basic quota restrictions on the number of foreigners to be employed in all companies. A specific revision for the oil, gas and mining sector was laid out in Decree No. 63/2011. This did not define a fixed percentage but rather defined loose formula depending on the number of employees, as outlined in Table 7.6. To provide an example of the extent to which discretion can be exercised in levels of local content, Anadarko have claimed that 20 per cent of their workforce needed to build their first LNG train in Palma Bay will be indigenous workers.⁶⁷ They also have suggested that the proportion of local labour for gas operations will increase annually as standards of training and experience enhance the abilities of the local workforce.⁶⁸

The process of obtaining visas and foreign work permits can be subject to delays and face bureaucratic difficulties.⁶⁹ It is generally advisable to seek assistance through a local

⁶⁷ ERM/Impacto, "Anadarko Mozambique Área 1, LDA," August 2013. <<http://www.erm.com/PageFiles/13352/Draft-EIA-Aug2013/Chapter-4-LNG.pdf>>.

⁶⁸ Ibid. §4.4.7.

⁶⁹ KPMG, Mozambique Country Profile, 2012. <<http://www.kpmg.com/Africa/en/KPMG-in-Africa/>>

lawyer, consulting firm or individual familiar with the process. The Ministry of Labour approves the employment of foreign nationals and the Ministry of Interior's Immigration Department issues a DIRE (a work permit/identification card).

7.4 Operators and concessionaires

7.4.1 International oil companies (IOCs)

Foreign companies operating in Mozambique are required to do so either through a branch in the country or a subsidiary.⁷⁰ Table 7.7 details the main IOCs active in Mozambique with other partnering companies mentioned in the Remarks column.

Table 7.7: Major IOCs active in Mozambique

Operating company	Project and production	Remarks
Anadarko	Area 1	Anadarko operates Area 1, where it holds a 36.5 per cent stake, in a joint venture with Mitsui E&P (20 per cent), Empresa Nacional de Hidrocarbonetos (ENH, 15 per cent), BPCL Ventures (10 per cent), Videocon (10 per cent) and PTT Exploration and Production (8.5 per cent). Andarko has discovered more than 100 tcf of recoverable reserves of natural gas and gas discoveries were made throughout 2011-2012 in the Windjammer, Ironclad-1, Barquentine, Lagosta, Tuburao and Camarao fields.
Eni	Area 4	Eni owns and operates Area 4 with a 50 per cent interest, in partnership with China National Petroleum Corporation (CNPC, 20 per cent), GalpEnergia (10 per cent), Kogas (10 per cent) and ENH (10 per cent). Exploration started in 2012 and more than 25 tcf of recoverable reserves of natural gas were discovered within a few months. Gas discoveries in 2012 of more than 40 tcf in the Mamba South, Mamba North and Mamba North East 1 regions boosted estimated recoverable reserves.
Petronas	Area 3 Area 6	Petronas, the Malaysian national oil company, holds a 50 per cent operating interest in Areas 3 and 6, in partnership with Total (40 per cent) and ENH (10 per cent). It was undertaking appraisals in these areas in 2013.

Documents/Mozambique.pdf>.

70 Hann, P., "Doing Business Internationally in Mozambique," Inside Business 360, 8 March 2011. <<http://www.insidebusiness360.com/index.php/doing-business-internationally-mozambique-5595/>>.

Statoil	Area 2 Area 5	Statoil holds a 40 per cent operating interest in Areas 2 and 5, in partnership with INPEX (25 per cent), Tullow (25 per cent) and ENH (10 per cent). Appraisal drilling was underway in 2013.
Sasol Petroleum International Pty Ltd (SPI)	Temane Field Pande Field 3.13 bm ³ (2012) Area A Block 19 Block 16 Sofala Bay	<p>SPI is the upstream division of the Sasol Group and has three Mozambican subsidiaries: Sasol Petroleum Temane (SPT), Sasol Petroleum Mozambique (SPM) and Sasol Petroleum Sofala (SPS). Sasol owns and operates the Temane and Pande onshore natural gas fields in Inhambane province, in partnership with ENH. It also discovered a small, but commercially viable, oil field in Inhambane in 2013, from which it plans to start exporting oil in 2014. During their appraisal programme, which ended in March 2013, the company extracted 236 Mbbl of light oil, production is expected to be 2 Mbbl/d.</p> <p>Sasol is a co-owner of the ROMCO pipeline that transmits the gas via an overland pipeline to Sasol's gas-to-liquids industrial complex in Secunda, South Africa. It is now exploring in Block 19 in the Mozambique basin, which is both onshore and offshore in the south of Mozambique, in partnership with Petronas and ENH. In 2012-13, the company had to abandon its Mupeji-1 exploration in M-10 as a dry well lead to SPI relinquishing its licence for the block. It also relinquished its licence the deepwater parts of Areas 16 and 19 in June 2013.</p>

Source: see footnotes.⁷¹

7.4.2 National oil companies

Mozambique had a legacy of state control during the Cold War but liberalised and adopted market policies in 1987. No public company has a monopoly over mining, oil and gas. However, utilities remain under monopolies, especially transport which is overseen by the Ministry of Transport and Communications, and regulated by CFM (Portos e Caminhos de Ferro de Mozambique), the port and rails authority. Most of the public equity stakes

71 2b1st Consulting, "Total signed Farm-in agreement with Petronas in Mozambique," 12 October 2012. <<http://www.2b1stconsulting.com/total-signed-farm-in-agreement-with-petronas-in-mozambique/>>; Deloitte, "The Deloitte Guide to Oil and Gas in East Africa," January 2013. <<http://www.deloitte.com/assets/Dcom-Kenya/Local%20Assets/Documents/The%20Deloitte%20Guide%20to%20oil%20and%20gas%20in%20East%20Africa.pdf>>; "Mozambique: First Commercial Oil From Mozambique in 2013 – Sasol," AllAfrica, 29 November 2013. <<http://allafrica.com/stories/201311300146.html>>; Sasol, "Annual Integrated Report," 30 June 2013. <http://www.sasol.co.za/sites/default/files/publications/integrated_reports/downloads/Sasol%20IR%202013lores.pdf>; Statoil, Statoil farms down in Mozambique licence, 2 April 2013. <http://www.statoil.com/en/NewsAndMedia/News/2013/Pages/02Apr_Mozambique.aspx>; "Mozambique State to Invest Up to Five Billion Dollars in Rovuma Basin," AllAfrica, 22 July 2013. <<http://allafrica.com/stories/201307231505.html>>.

in oil and gas are held by CMH. However, there are also other public stakes held by other entities. For example, IGEPE (Instituto de Gestão das Participações do Estado) is an institution under the Ministry of Finance in charge of the Government's stake in all mega projects involving investments of over USD 500 million. Table 7.8 summarises the state owned company involvement in the oil and gas sector in Mozambique.

Table 7.8: Main state-owned companies involved in the Mozambican oil and gas sector

State Owned Company	Role
Instituto Nacional de Petroleo (INP)	INP regulates the hydrocarbon sector and sets policies and strategies including the oversight of national oil companies and other state-owned companies. In practice, the oversight may be subject to political interference and corruption. The Government does not require disclosure of beneficial ownership in oil and gas companies or projects. Very little information on these companies is published. The Government officials with a role in the oversight of the oil and gas sector are not required to disclose information about their financial interest in any extractive activity or projects.
Empresa Nacional de Hidrocarbonetos (ENH)	<p>ENH is the national hydrocarbon company charged with managing the interests in all oil and gas projects involving the state. It can be a minority or majority shareholder. The company has various subsidiaries and it is anticipated that it will play an increasing role as an operator in future years.</p> <p>Projects with which it is involved in and its future development plans include:</p> <ul style="list-style-type: none"> • All oil and gas exploration and production projects in Mozambique; currently it has an interest in 11 concessions • Gas distribution network in Maputo, Marracuene and Northern Inhambane.
Companhia Moçambicana de Hidrocarbonetos (CMH)	The company is in the upstream sector and is a subsidiary of ENH. It is charged with managing the public stake in the Sasol natural gas extraction fields and the natural gas processing plant in Inhambane province, which CMH has a 25 per cent stake in. Total onshore reserves of 3.59 tcf are found in Inhambane province. A production concession contract was signed in October 2000 for 30 years. It expanded its Central Processing Plant in 2012. It has agreements with Sasol South Africa for various gas and condensate sales, with a 4 per cent royalty tax.

Companhia Moçambicana do Gasaduto (CMG)	<p>CMG is ENH's subsidiary at the transmission level. CMG has a 25 per cent equity stake in the ROMCO pipeline company transporting the majority of the gas processed at the Sasol onshore fields to Secunda in South Africa. The proportion which is used domestically is managed by Matola Gas Company, a private, Mozambican gas distribution entity based in Maputo.</p>
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Source: National Petroleum Institute. <<http://www.inp.gov.mz/>>; Empresa Nacional de Hidrocarbonetos. <<http://www.enh.co.mz/>>; Companhia Moçambicana de Hidrocarbonetos. <<http://www.cmh.co.mz/en/>>.

Joint ventures (JV) and production sharing contracts (PSC)

The PSC regime requires the state-owned ENH to hold a stake in all oil and gas ventures. Currently it is compulsory for the state to have a carrying interest of at least 5 per cent in oil and gas projects, and the state has the right to stipulate how oil and gas will be allocated and used. There are no compulsory domestic usage criteria.

7.5 International suppliers

Siemens is active in Mozambique in the industry, energy and healthcare sectors, and has a local branch in the nation's capital, Maputo.⁷² ABB opened an office in Maputo in 2012, although their operations have been focused on the electricity sector thus far. As this is ABB's first office in Mozambique, the company aims to supply its electrical engineering expertise through an increased local presence.⁷³ Other major engineering companies, including GE and Alstom, do not have local branches in Mozambique.

7.5.1 Upstream

The Rovuma LNG project is under development with the aim of shipping the first LNG cargo in 2018. In December 2012, the US oil and gas exploration company Anadarko announced that the following three companies would do independent, competitive offshore installation FEEDs for Offshore Area 1 development:⁷⁴

- Technip USA, Inc.
- A JV comprised of Subsea 7 and Saipem SA
- A JV comprised of McDermott and Allseas USA.

The FEEDs will each culminate with the delivery of a full engineering, procurement, installation and commissioning plan for the Offshore Area 1 development.

⁷² Siemens, Siemens Mozambique. <http://africa.siemens.com/pool/siemens_in_africa/country_profiles/mozambique.pdf>.

⁷³ "ABB opens office in Maputo," ABB, 11 October 2012, <<http://www.abb.co.za/cawp/seitp202/5d9af1fcfbdfc016c1257a94002351a3.aspx>>.

⁷⁴ "Anadarko Announces Advancement of Mozambique LNG Project," Anadarko, 21 December 2012. <<http://www.anadarko.com/Investor/Pages/NewsReleases/NewsReleases.aspx?release-id=1769213>>.

7.5.2 Midstream

KBR and Technip

For the Rovuma development, KBR and Technip have been contracted to carry out the pre-FEED for the Rovuma LNG plant. It is reported that the contract includes the execution of the conceptual study on the following facilities:⁷⁵

- Offshore floating production unit
- Subsea production wells
- Subsea pipelines to the shore
- LNG trains (each with the capacity of 5 MMtpa)
- LNG storage tanks
- LNG export terminal.

Anadarko further announced that, for the onshore Rovuma LNG development, the following three companies would execute independent, competitive LNG FEEDs:⁷⁶

- A JV comprised of JGC Corporation and Fluor Transworld Services
- A JV comprised of an affiliated company of CB&I and Chiyoda Corporation
- Bechtel.

The FEEDs will develop an overall LNG park plan for the capability to produce approximately 50 MMtpa of LNG in future years. Each of the LNG FEEDs will deliver designs for an initial development consisting of four liquefaction trains with capacity of 5 MMtpa per train. The FEEDs will culminate in the delivery of a full engineering, procurement and construction plan, and a lump-sum turnkey price for the initial two 5-MMtpa trains, as well as associated common facilities. Construction work is expected to begin in 2014.

7.5.3 Downstream

McConnell Dowell

The Sasol Petroleum International Gas Pipeline transports natural gas from Mozambique to South Africa. According to the US Energy Information Administration, the majority of natural gas produced in Mozambique is exported via this route while the remainder is consumed domestically.⁷⁷ The design and construction of the pipeline was executed by McConnell Dowell, a South African engineering company. The pipeline is 865 km in length

⁷⁵ Gismatullin, E., "Anadarko Hires Technip, KBR to Design LNG Plant in Mozambique," Bloomberg, 22 August 2011. <<http://origin-www.bloomberg.com/news/2011-08-22/anadarko-hires-technip-kbr-to-design-lng-plant-in-mozambique.html>>; 2b1st Consulting, "Anadarko gears up on Mozambique LNG," 4 October 2012. <<http://www.2b1stconsulting.com/anadarko-gears-up-on-mozambique-lng/>>.

⁷⁶ Ibid.

⁷⁷ US Energy Information Administration, Mozambique, April 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=MZ>>.

and 26 inches in diameter and connects the Temane Gas Field to Sasol's Petrochemical Plant in Secunda, Mpumalanga Province. This pipeline project was started in March 2002 and completed in February 2004. The project value was USD 275 million.⁷⁸

Wärtsilä

This Finnish company provided 18 Wärtsilä 34SG engines running on natural gas for the Ressano Garcia gas-fired power plant. Wärtsilä signed an operation and management agreement lasting for three years covering the gas engines.⁷⁹

7.6 Future opportunities for international suppliers

The key conclusions from the country analysis are as follows:

- Political instability, corruption and the lack of human development are challenges in the Mozambican business environment.
- Basic infrastructure is poor because of the civil war. Extensive construction and renovation is taking place.
- Oil production is minimal. Because of its coastal location, Mozambique is an important country for landlocked countries to receive oil through.
- There are very high levels of possible gas reserves.
- Exploration and development has shifted its focus from the central Temane and Pande fields to the offshore blocks in the north. Much of the activity is still in the appraisal phase. A leasing round will take place in 2014.
- The majority of gas exports are for South Africa. This looks likely to be eclipsed by trade with Asia, especially Japan. Exports and domestic consumption are both rising.
- The LNG facility must avoid becoming subject to delays in order for Mozambique to have the best chance possible of becoming an important international exporter of LNG.
- There is a high level of interest in investment in projects which use gas.
- The local content laws are not specific. A level of discretion can apply due to their vagueness.
- ENH is involved in all concessions and typically holds an interest of 10 per cent.

Key opportunities in Mozambique identified by UK Trade and Investment and from the above discussion include:⁸⁰

78 McConnell Dowell, "Digging Deep." <<http://www.macdow.com.au/assets/download/Sasol%20Petroleum%20International%20Natural%20Gas%20Pipeline.pdf>>; McConnell Dowell, History. <<http://www.macdow.com.au/corporate/history>>.

79 "Wärtsilä signs service agreement for Mozambique power plant," Wärtsilä, 29 April 2013. <http://www.wartsila.com/en_NE/news-releases/wartsila-signs-service-agreement-for-mozambique-power-plant>.

80 UK Trade and Investment, Oil and Gas Sector in Mozambique, 22 January 2013. <<http://opentoexport.com/article/oil-and-gas-sector-in-mozambique/>>.

- Pemba and Palma port development and management
- Equipment for the exploration and appraisal of the six blocks in the Rovuma basin
- Pipeline engineering and construction (subsea, onshore and international)
- (Floating) LNG plant engineering and construction
- Design and construction of the Nacala oil refinery
- Gas monetization projects for local use and domestic consumption (methanol, gas-to-liquid, fertilizers, power generation, LPG etc.)
- Provision of specialised goods and services (tubular goods, maintenance and repair services, drilling and well intervention services, logging services etc.)
- Aviation services, field support services, camp management including health services, security and housing.

8. Tanzania, United Republic of

8.1 Business environment

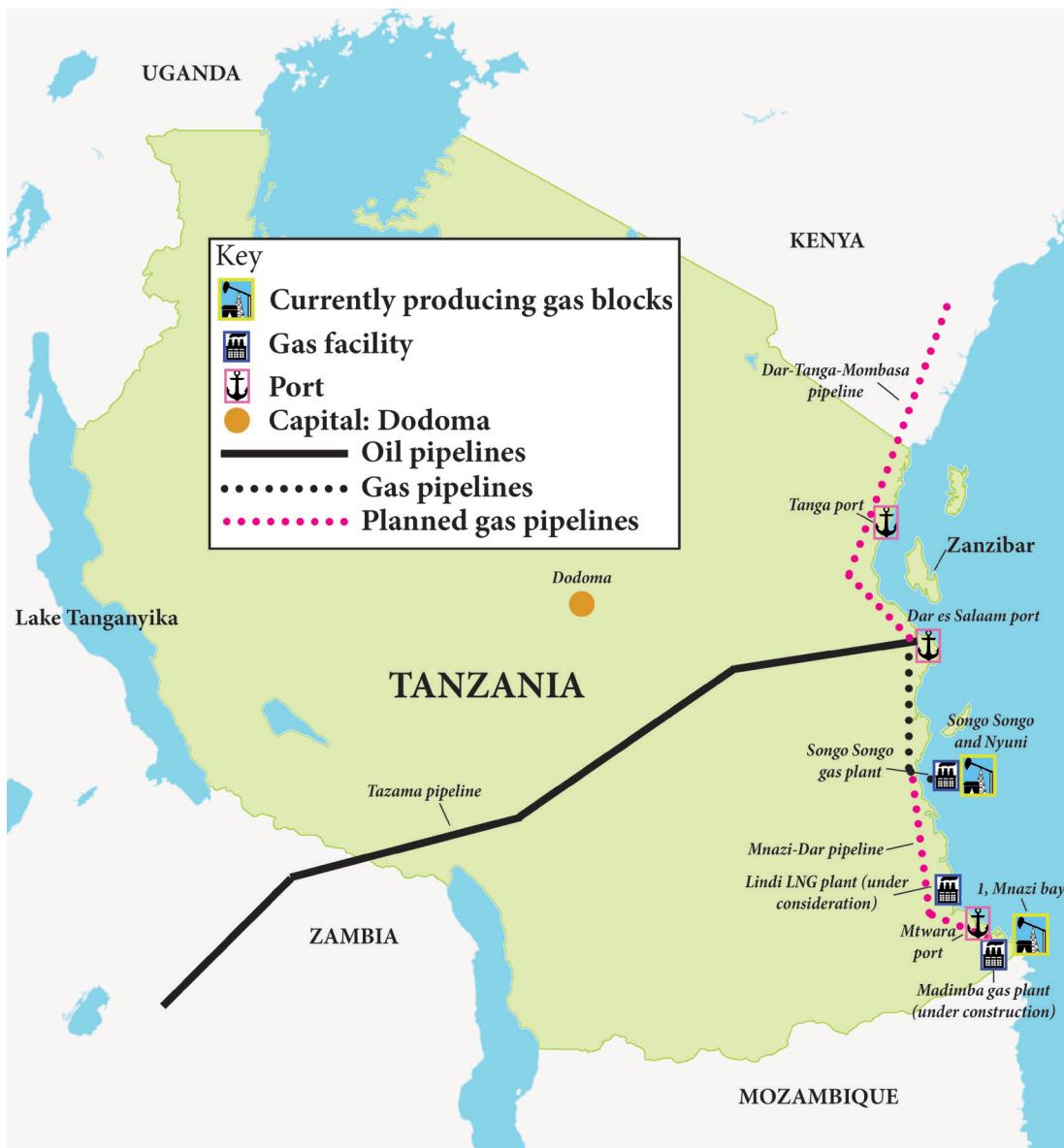
In the last decade, Tanzania's economy has witnessed steady growth. The newly-found gas resources on the East Coast of the country could be an important factor to further ensure a successful delivery of the country's medium-term economic development (see Table 8.1 and Figure 8.1). Corruption, insufficient infrastructure and government bureaucracy are difficult challenges faced by international businesses in Tanzania.

Table 8.1: Tanzania facts and figures

Capital	Dodoma
Official language	Swahili and English
Area	947,000 km ²
Population (2013 estimate)	48,261,942
Currency	Tanzania Shilling
GDP (PPP) total (2013)	USD 79.29 billion
GDP (PPP) per capita (2013)	USD 1,700
GDP (official exchange rate) total (2013)	USD 31.94 billion
GDP (official exchange rate) per capita (2013)	USD 650
State Corruption Index (2013)	111 (out of 177)
Proven oil reserves (2013)	0
Proven natural gas reserves (2013)	0.23 tcf
Total oil production (2013)	0.01 Mbbl/d
Total natural gas production (2013)	32.8 bcf

Sources: United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/tz.html>>; US Energy Information Administration, Tanzania, April 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=tz>>; Transparency International, "Corruption Perception Index 2013," December 2013. <<http://www.transparency.org/country#TZA>>; OPEC, "OPEC Annual Statistical Bulletin 2013," July 2013. <http://www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB2013.pdf>.

Figure 8.1: Tanzania's major oil and gas activity and infrastructure



Base map from FreeVectorMaps.com
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8.1.1 Political stability and security

One party rule ended in 1995 when the first democratic elections since the 1970s took place in the country. Nevertheless, the same party, Chama Cha Mapinduzi, has been in power since 1995, and divisions within the party are likely to grow. Zanzibar is an island state and has its own parliament and president, hence is semi-autonomous. The formation of a government of national unity between Zanzibar's two leading parties succeeded in minimizing electoral tension in 2010.

Although Tanzania consists of more than 120 ethnic groups, inter-ethnic conflict has not shown to be a significant problem, and there is no one dominant group.¹

However, there are increasing tensions between the mainland and Zanzibar, largely due to religious differences. The mainland is composed of 30 per cent Christian, 35 per cent Muslim and 35 per cent indigenous beliefs; whereas Zanzibar is more than 99 per cent Muslim.² This religious difference is compounded by dissatisfaction on the mainland over the distribution of revenue from the gas sector. In southern Tanzania, violence broke out in Mtwara in late 2012 and early 2013 over the construction of a nearby gas pipeline where the residents have long complained about economic and social marginalisation.³ However, the dominance of the ruling party should secure broad political stability in the country. The Economist political risk index ranks Tanzania as B.⁴

Tanzania is ranked 111 out of 177 in the corruption perceptions index rankings.⁵ The Prevention of Corruption Bureau, the Good Governance Coordination Unit and the Ethics Inspectorate Department are the most prominent institutions involved in combatting corruption in Tanzania. In 2008, a corruption scandal led the Prime Minister to resign. An independent international audit of Tanzania's Central Bank found that more than USD 120 million was claimed to have been paid to local companies, the majority of which turned out to be fictitious. In 2012, six high profile ministers were also dismissed by President Jakaya Kikwete amid allegations of corruption.⁶ The Auditor General has estimated that approximately 20 per cent of the Government budget is lost annually to corruption.⁷

8.1.2 Economy

Tanzania has a large population of 48 million and the population is growing at the fast rate of 2.8 per cent. In 2012, the country's GDP at official exchange rates was USD 31.94 billion and the GDP per capita was one of the lowest in the world at USD 650. The real growth rate was a solid 7 per cent. Agriculture composes over a quarter of the GDP and is an important export business for Tanzania. Tourism and mining are also key sources of income for Tanzania.⁸ In 2011, imports totalled USD 12 billion and exports totalled USD

1 International Work Group for Indigenous Affairs, "The Indigenous World 2013," 25 May 2013. <<http://www.iwgia.org/regions/africa/Tanzania>>

2 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/tz.html>>.

3 Kulish, N., "Violent Episodes Grow in Tanzania, an African Haven," New York Times, 30 June 2013. <<http://www.nytimes.com/2013/07/01/world/africa/violent-episodes-grow-in-tanzania-an-african-haven.html?pagewanted=all&r=2&>>.

4 The Economist Intelligence Unit, Tanzania, 13 March 2014. <<http://country.eiu.com/tanzania>>.

5 Transparency International, "Corruption Perception Index 2013," December 2013. <<http://www.transparency.org/country#TZA>>.

6 "Tanzania leader sacks ministers amid corruption scandal," BBC News, 4 May 2012. <<http://www.bbc.co.uk/news/world-africa-17957767>>.

7 U4 Anti-Corruption Resource Centre, "Overview of corruption and anti-corruption in Tanzania," May 2009. <<http://www.u4.no/publications/overview-of-corruption-and-anti-corruption-in-tanzania/>>.

8 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/tz.html>>.

7.4 billion.⁹

Tanzania's overall socio-economic development is set out in the Tanzania Development Vision 2025, published in 1999 during the middle of President Benjamin Mkapa's rule.¹⁰ Mkapa is well-respected in Tanzania as his leadership led to significant economic growth and social development while he also managed to calm the previously erratic inflation. The main drivers of the growth of the economy are telecommunications, transport, financial intermediation, manufacturing, construction, and trade. A 40-year soft loan of USD 310 million from the World Bank was agreed on for various agricultural projects. The newly found natural gas resources could provide the impetus for future development of the economy if managed correctly.¹¹ Foreign Direct Investment in the gas sector has had robust growth and the total FDI inflows were USD 1.1 billion in 2011, notably from South Africa, Canada and the UK.¹²

8.1.3 Infrastructure

The urban population is relatively low in Tanzania and in 2012, only 27 per cent of the population lived in urban areas. However, the rate of urbanisation has been rapid in Tanzania at 4.8 per cent.¹³ The country faces an infrastructure problem, for example, the port of Dar es Salaam suffers from performance problems because of the rapid growth in traffic exposing deficiencies in storage and access to the port. Expenditure on the country's infrastructure has, however, risen dramatically in recent years and there are several major infrastructure projects currently underway. There is an integrated roads programme which aims to upgrade 70 per cent of the country's 10,300 km of main roads and build approximately 3,000 km of new main roads. Connections between Namanga, Arusha, Moshi, Himo, Dar es Salaam and Morogoro are adequate, although they too require improvements to accommodate the increasing amounts of traffic. The USD 10 million expansion of Kilwa Road in the South is also underway.¹⁴ Five ports within Lake Tanganyika are under construction, and the existing railways are being rehabilitated for heavy duty operations.¹⁵

Tanzania's infrastructure is ranked 124 out of 148 by the Global Competitiveness index produced by the World Economic Forum.¹⁶ Due to the levels of tourism in the country, Tanzania possesses one of the most competitive domestic air transport divisions in Africa. In addition, 65 per cent of the population have mobile phone subscriptions. Improvements, however, need to be made with regard to the power supply and access to

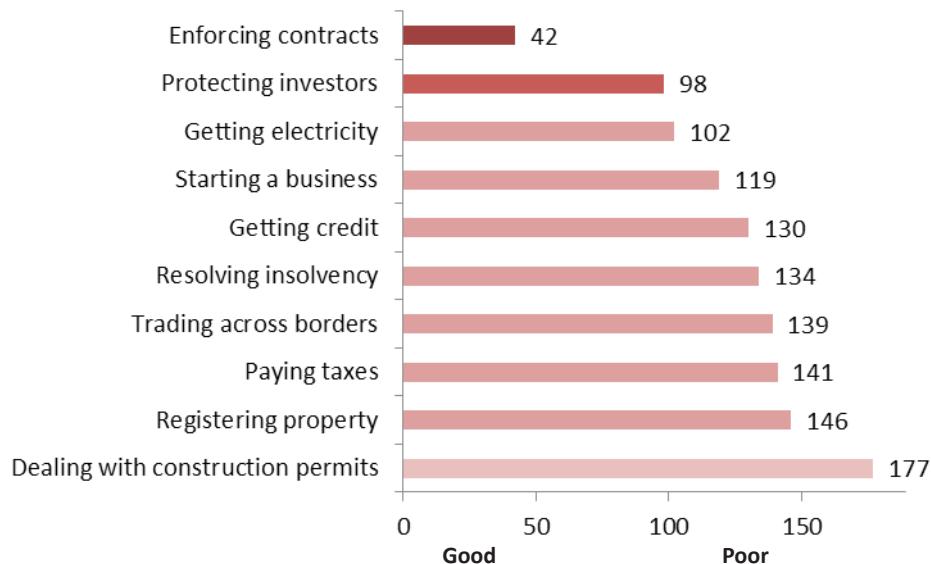
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- www.cia.gov/library/publications/the-world-factbook/geos/tz.html.
- 9 Spring, A. and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.
- 10 Tanzania, "The Tanzania Development Vision 2025," 1999. <<http://www.tzonline.org/pdf/theTanzaniadevelopmentvision.pdf>>.
- 11 African Development Bank, Tanzania Economic Outlook, May 2013. <<http://www.afdb.org/en/countries/east-africa/tanzania/tanzania-economic-outlook/>>.
- 12 Spring, A. and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.
- 13 United States, Central Intelligence Agency, "The World Factbook: 2013," 11 March 2014. <<https://www.cia.gov/library/publications/the-world-factbook/geos/tz.html>>.
- 14 KPMG, "Tanzania – Country Profile," 2012 <<http://www.kpmg.com/Africa/en/KPMG-in-Africa/Documents/Tanzania.pdf>>.
- 15 Spring, A. and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.
- 16 World Economic Forum, "Global Competitiveness Report 2013-2014," 3 September 2013. <http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf>.

safe water. Currently, only 14 per cent of Tanzanians have access to electricity.¹⁷ New coal power plants have been built but the state-owned power utility, Tanesco, faces financial difficulties, therefore they are unable to supply adequate power.¹⁸ Even if the current significant inefficiencies in the execution of infrastructure development were resolved, the annual funding gap for infrastructure of USD 0.7 billion would remain.¹⁹

8.1.4 Operating in Tanzania

Tanzania is ranked 145 out of 189 countries in the world in relation to the ease of doing business in (see Figure 8.2). Consequently, Tanzania is more difficult than the average sub-Saharan nation in terms of ease of conducting business.

Figure 8.2: Ease of doing business rankings for Tanzania



Note: Countries are ranked from 1 to 189, with 1 as the best and 189 as the most difficult.

Source: Doing Business, "Doing Business 2014. Economy Profile: Tanzania," 29 October 2013.

<<http://www.doingbusiness.org/reports/subnational-reports/~media/giawb/doing%20business/documents/profiles/country/TZA.pdf>>.

Several factors make business in Tanzania economically and administratively ineffective. Major reforms are underway to streamline bureaucratic business registration and licensing procedures and the result of this is that construction permits are now more expensive.²⁰ Registering a property is, however, not as expensive, costing 4.5 per cent of the property's value, but it does take approximately 10 weeks to process.

17 US Energy Information Administration, Tanzania, April 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=tz>>.

18 Spring, A. and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.

19 Shkaratan, M., "Tanzania's Infrastructure: A Continental Perspective," World Bank Policy Research Working Paper Series, February 2012. <<http://elibrary.worldbank.org/doi/10.1596/1813-9450-5962>>.

20 Spring, A. and Rolfe, R., "Sub-Saharan Africa Business Environment Report, 2012-2013." <http://warrington.ufl.edu/centers/ciber/docs/SABER_2012-2013.pdf>.

The tax a business needs to pay in Tanzania is costly at 45 per cent of the total income, which is a much higher percentage than found in most other sub-Saharan African countries. This has been the primary obstacle for encouraging the formalisation of enterprises in Tanzania.²¹ The situation is slightly better when it comes to the cost and efficiency of importing and exporting, as Tanzania matches the average for the region. A requirement has been introduced that a certificate of conformity must be presented before imported goods are shipped.

The dependence upon hydroelectric power renders Tanzania's electricity supply unreliable as Tanzania is prone to droughts. The transmission and distribution network suffers from inefficiencies and under-investment.²² The Millennium Challenge Corporation is an important source of funding, providing USD 206 million to construct sub-stations and nearly 2,800 km of the power grid. Many future projects are planned to increase the grid capacity yet these are subject to delays and in the early stages of development.²³

Enforcing contracts in Tanzania is far more efficient and cost-effective than the sub-Saharan average with court cases over commercial disputes averaging at a year and a half and costing 14 per cent of the value of the claim.

Depending on how the local content laws develop over the coming years, the lack of an adequately trained workforce may become a problem for IOCs (see Section 8.3.4).

8.2 Resources and infrastructure

8.2.1 Oil

Tanzania does not currently have any proven oil reserves.²⁴ Onshore oil seeps from the Tanzanian Coastal Basin and discoveries in neighbouring Uganda and Kenya suggest that there may be untapped oil reserves in the country.²⁵ Oil exploration is currently taking place at Lake Tanganyika, located in the west of the country.²⁶

21 Research on Poverty Alleviation, "The Investment Climate in Tanzania," December 2009. <http://www.repoa.or.tz/documents/brief_17-repoa.pdf>.

22 Lovett, A., "Tanzania: Energy sector overview," Infrastructure Journal, 7 February 2013. <<http://www.nortonrosefulbright.com/knowledge/publications/79377/tanzania-energy-sector-overview>>.

23 Ibid.

24 US Energy Information Administration, Tanzania, April 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=TZ>>.

25 Tanzania Petroleum Development Corporation, The Petroleum Potential of the Mafia Deep Offshore Basin, 2014. <http://www.tpdc-tz.com/tpdc/directorate/exploration/Deep_Offshore_Basins.php>; Kapinga, W. and Thorns, A., "Tanzania," The Oil and Gas Law Review, November 2013. <http://www.mkono.com/pdf/Tanzania%20OIL_GAS%202013.pdf>.

26 Ibid.

8.2.2 Gas

Reserves

Tanzania has 230 bcf of proven natural gas reserves.²⁷ This figure has stayed roughly the same since 1983, but is set to increase as resource estimates change due to increasing numbers of appraisal and exploration drilling projects, and completion of reserve certification (see Table 8.2). Tanzania's Natural Gas Policy Draft in October 2012 claimed that natural gas discoveries were significantly higher than current proven reserves, discoveries both onshore and offshore totalling 33 tcf with 8 tcf of those discoveries made at the onshore gas fields at Songo Songo, Mnazi Bay, Mkuranga, Kiliwani North and Ntorya. As of March 2013, according to a revised draft of Tanzania's Natural Gas Policy, the figure for natural gas discoveries had increased to 40 tcf from both on- and offshore basins.²⁸

Table 8.2: Recent offshore natural gas discoveries in Tanzania

License	Name	Discovery date	Recoverable gas resources	Recoverable and non-recoverable gas resources
Blocks 1, 3 and 4, owned by BG Group (60 per cent) and Ophir Energy (40 per cent)				
Block 1	Chaza-1	Apr 2011	10+ tcf in total	N/A
Block 1	Jodari Field	Mar 2010		
Block 1	Mzia	May 2012		
Block 1	Mzia 2	Feb 2013		
Block 3	Papa	Aug 2012		
Block 4	Pweza-1	Oct 2010		
Block 4	Chewa-1	Dec 2010		
Block 2, owned by Statoil (65 per cent) and Exxon Mobil (35 per cent)				
Block 2	Zafarani-1	Feb 2012	10-13 tcf in total	15-17 tcf in total
Block 2	Lavani	June 2012		
Block 2	Lavani-2	Dec 2012		
Block 2	Tangawizi-1	Mar 2013		
Ntorya field, owned by Aminex (75 per cent) and Solo Oil (25 per cent)				

27 US Energy Information Administration, Tanzania, April 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=TZ>>.

28 United Republic of Tanzania, United Republic of Tanzania Ministry of Energy and Minerals, Natural Gas Policy of Tanzania, May 2013. <<http://kefalomy.files.wordpress.com/2013/05/draft-the-natural-gas-policy-of-tanzania-2013.pdf>>.

Rovuma PSA	Ntorya-1	Feb 2012	N/A	1.2 tcf
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Source: US Energy Information Administration, Tanzania, April 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=TZ>>.

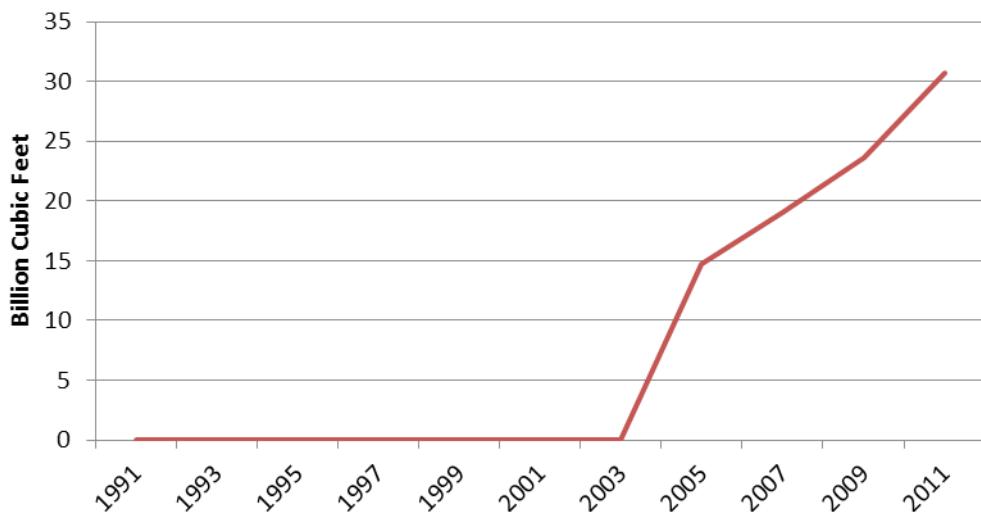
Tanzania's natural gas blocks are situated primarily in the Mafia Deep Offshore Basin (MDOB), the Rovuma Basin and the Madawa Sub-Basin. Block 1 is located within the Rovuma Basin that stretches between Mozambique and Southern Tanzania. Discoveries made by Statoil in Block 2 during 2012 and 2013 have further enhanced the country's LNG export potential. The MDOB, which contains Blocks 3 and 4, is next to the Tanzanian Coastal Basin where there are known onshore oil seeps and subsurface gas discoveries.²⁹

Shell has held the rights since 2002 to develop Blocks 9 to 12 located in Northern Tanzania, but has yet to begin serious exploration in the area due to tensions with the Revolutionary Government of Zanzibar, a semi-autonomous part of the country. A Memorandum of Understanding between Shell and the Government in August 2013 may result soon in Shell being able to explore the blocks.³⁰

Production

Natural gas production levels have increased in Tanzania over the past 10 years. The country produced no natural gas until 2004, when it produced 4.6 bcf. By 2011, Tanzania was producing 30.7 bcf (see Figure 8.3). Production levels are set to increase as exploration and production activity continues to expand.³¹

Figure 8.3: Tanzania gross natural gas production (1991-2011)



Source: US Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

29 Tanzania Petroleum Development Corporation, The Petroleum Potential of The Mafia Deep Offshore Basin. <http://www.tfdc-tz.com/tfdc/directorate/exploration/Deep_Offshore_Basins.php>.

30 Kiishweko, O., "Zanzibar and Shell to cooperate in gas, oil sector," Daily News, 30 August 2013. <<http://www.dailynews.co.tz/index.php/biz/21645-zanzibar-and-shell-to-cooperate-in-gas-oil-sector>>.

31 Tanzania Petroleum Development Corporation, The Petroleum Potential of The Mafia Deep Offshore Basin. <http://www.tfdc-tz.com/tfdc/directorate/exploration/Deep_Offshore_Basins.php>.

The Songo Songo and Mnazi Bay fields are the only currently producing gas fields in Tanzania.

The Songo Songo on- and offshore fields, operated by Orca, are located 15 km off the coast of Tanzania, 200 km south of Dar es Salaam. The gas is extracted from five wells – two onshore and three offshore – and is sent to a plant on Songo Songo island before being piped to Dar es Salaam, where it is used to generate electricity.³² Production started in 2004, and the first delivery of gas was made to Dar es Salaam in July of the same year. The average production level in 2013 was approximately 98 MMcf/d.³³ According to Orca Exploration's 2013 Interim Report, the company intends to expand gas infrastructure and production at the field to meet the growing domestic demand for energy.³⁴ This includes rehabilitating existing wells and the drilling of additional production wells. Production levels are consequently forecast to increase dramatically in the coming years.

The Mnazi Bay fields, operated by French company Maurel et Prom, are currently served by only a single well, which feeds gas to the Mtwara power plant.³⁵ Production from these fields is expected to increase with the construction of a pipeline to Dar es Salaam, due to be operational in 2015.³⁶

Tanzania relies heavily on biomass-based fuels, most notably charcoal and firewood, for its energy needs. Biomass-based fuel accounts for more than 90 per cent of primary energy supply, and the requisite level of deforestation is unsustainable.³⁷ Petroleum based-energy sources account for 8 per cent of primary energy use. Development of natural gas for electricity is ongoing and it is likely that domestic consumption of natural gas will increase in the coming years. Currently all the gas produced is used for domestic consumption.

Exports

Tanzania does not export natural gas at present, but due to the recent proliferation of offshore finds, the country has the potential to become an exporter in the coming years.³⁸ The presence of multinational energy majors such as Petrobras, Exxon-Mobil and Shell in the country and the quick-progressing plans for a land-based LNG plant suggest that Tanzania is likely to start exporting LNG by the early 2020s.

Similar to Mozambique, Asia is the most likely export market for LNG from Tanzania. Tanzania is slightly behind Mozambique in terms of the amount of natural gas they have and their experience in exporting natural gas, as Mozambique has sold dry natural gas to South Africa for a long time. The scale and timing of the development of Tanzania's natural gas resources is in question, more so than in Mozambique, nonetheless, BG and Ophir are taking steps to develop the commercial framework for natural gas exports.

32 Offshore Technology, Songo Songo Gas Development and Power Generation Project, Tanzania. <<http://www.offshore-technology.com/projects/songosongo/>>.

33 Orca Exploration, "2013 Q3 Interim Report." <http://www.orcaeexploration.com/pdfs/2013_ORCA_Q3.pdf>.

34 Ibid.

35 Maurel et Prom, "2012 Annual Report," April 2013. <<http://www.maureletprom.fr/joomdocs/interactif-EN%20-%203.pdf>>.

36 Pipelines International, "Tanzanian pipeline construction inaugurated," September 2012. <http://pipelinesinternational.com/news/tanzanian_pipeline_construction_inaugurated/077220/>.

37 Mushi, D., "Tanzania: How Biomass Use Fuels Rapid Deforestation," All Africa, 18 May 2012. <<http://allafrica.com/stories/201205180044.html>>.

38 US Energy Information Administration, Tanzania, April 2013. <<http://www.eia.gov/countries/country-data.cfm?fips=TZ>>.

8.2.3 Oil and gas infrastructure

The Tazama crude oil pipeline is 1,720 km long. It runs from the Single Point Mooring terminal in Dar es Salaam to the Tanzania Italian Petroleum Refinery (TIPER) in Dar es Salaam and the Indeni refinery in Ndola, Zambia. The TIPER oil refinery was constructed in 1963 but closed in 1991 as it was running at a loss. It is now used as a bulk storage facility.³⁹ The pipeline is owned by Tazama Pipeline Limited, which is a joint company of the Governments of Zambia (66.7 per cent) and Tanzania (33.3 per cent), and replacing the pipeline to improve performance and capacity is currently under consideration.⁴⁰ Zambia will begin constructing a new oil refinery in 2016 which will be located alongside the Tazama pipeline. The project also involves building a new export pipeline for petroleum products to Tanzania.⁴¹

The Songo Songo pipeline transports gas to the city of Dar es Salaam, where it is used as the principal fuel for turbine generators at the Songas Ubungo power plant. Songas owns the Ubungo power station, which currently supplies 20 per cent of Tanzania's electricity needs with its generating capacity of 180 MW⁴²

The Songo Songo gas processing plant and pipelines were built and are owned by Songas, a JV composed of CDC Globaleq, Tanesco, Tanzania Petroleum Development Corporation and Tanzania Development Finance Co Ltd. CDC Globaleq has the controlling interest, and Orca Exploration, the Canadian operator of the Songo Songo field, operates the processing facility on their behalf.⁴³ The processing infrastructure includes two gas processing trains, which currently have capacity to process up to 102 MMcf/d. Processed gas is transported from Songo Songo to Dar es Salaam in high pressure offshore and onshore pipelines operated by Songas. Plans are awaiting approval for Songas to expand the processing infrastructure by installing two new gas processing transmission trains on Songo Songo Island so that it would ultimately handle 200 MMcf/d.⁴⁴

Tanzania currently has six gas-fired power stations in total, namely Songas, Ubongo I and II, Tegeta, Mtwara, and Somanga power plants.

An LNG export facility, similar to the one found in Qatar, is being considered for Lindi, aiming for construction by 2020.⁴⁵ The project will affect the scale to which Tanzania becomes an important figure in natural gas exportation. The Tanzanian Government are unlikely to authorise the FDI for such a large project unless more gas reserves are discovered to confirm they have the resources to warrant the infrastructure development.

8.2.4 Planned oil and gas projects

In 2013, the Tanzanian Government launched the 'Big Results Now' initiative.⁴⁶ This

39 Mwamunyage, J., "Dar reviving new refinery plans," The East African, February 2009. <<http://www.theeastfrican.co.ke/news/-/2558/533022/-/rka64iz/-/index.html>>

40 Namutowe, J., "Zambia: State Ponders Replacing Tazama Pipeline," AllAfrica, 12 September 2013. <<http://allafrika.com/stories/201309130712.html>>.

41 Mutumweno, N., "Zambia to get a new oil refinery in 2016," Oil Review Africa, January 2014. <<http://www.oilreviewafrica.com/downstream/downstream/zambia-to-get-a-new-oil-refinery-in-2016>>.

42 Globaleq, Songas. <http://www.globaleq.com/portfolio/operating_assets/8/Songas>.

43 Offshore Technology, Songo Songo Gas Development and Power Generation Project, Tanzania. <<http://www.offshore-technology.com/projects/songosongo/>>.

44 Orca Exploration, Tanzania Exploration & Production. <http://www.orcaexploration.com/operations_tanzania_exploration.asp>.

45 Goswami, M., "Tanzania may build new LNG facility in Lindi – minister," Reuters, 27 November 2013. <<http://uk.reuters.com/article/2013/11/27/tanzania-gas-idUKL4N0J41DK20131127>>.

46 Devex, "Pipeline Reports – Big Results Now Delivery Program (Phase II) In Tanzania." <<https://www.devex.com/news/pipeline-reports-big-results-now-delivery-program-phase-ii-in-tanzania-91001>>.

highly ambitious set of short-term targets covers many areas of government service delivery. The energy sector is one of the most prominent of the targets, and the Ministry and other authorities made an unprecedented public pledge to meet certain goals by late 2015.⁴⁷ Central to meeting the targets is the Mnazi-Dar pipeline, from Mtwara port to Dar es Salaam, and gas-powered electricity generation in Dar es Salaam. The Government will continue to push gas companies to provide gas for the domestic market. Nonetheless, the swift development of an exporting LNG plant is likely, given the financial benefits such an industry would bring, as long as it can be shown there are sufficient resources. Table 8.3, Table 8.4 and Table 8.5 detail some of the planned project associated with the oil and gas industry in Tanzania.

Much of the drilling taking place in Tanzania at present is still in the exploration and appraisal phases. BG and Ophir have made several successful explorations in Blocks 1, 3 and 4, and have invested USD 1 billion in Tanzanian operations since they first became active in the country in 2010.⁴⁸ It seems likely, therefore, that these exploratory wells will lead to full production operations in the coming years. Tanzania is a growing market with currently 19 exploration blocks and USD 10-20 billion investment projected for upstream activities over the next 10 years. UK's Energy Industries Council DataStream is currently tracking 11 upstream projects, most of which are exploration projects, in Tanzania worth a total potential investment of USD 2.9 billion.⁴⁹

Similarly, Statoil and ExxonMobil's operations in Block 2 have yielded proof of significant natural gas reserves in the block, which Statoil says "mark an important step towards a possible natural gas development in Tanzania."⁵⁰

Noor Oil Industry and Technology failed to adhere to contractual agreements surrounding the construction of an oil refinery and oil pipeline between Dar es Salaam, Mwanza and Kigoma.⁵¹ The Tanzania Government are still interested in such a project in order to reduce domestic fuel costs and to potentially extend the pipeline to other landlocked countries, especially if oil is found in Lake Tanganyika where Kigoma is located.

Table 8.3: Planned upstream oil and gas projects in Tanzania

Project	Capacity (tcf)	(Estimated) Start-up	Sector	Operator
Lake Tanganyika	N/A	2014	Exploration	Beach Energy
Songo Songo	0.7	2015	Development	Orca
Ruvuma	5.57	2015	Exploration	Aminex

Source: see footnotes.⁵² See further the map of concession blocks, available at <<http://www.tpdc-tz.com/>>

47 devex.com/projects/pipelines/big-results-now-delivery-program-phase-ii-in-tanzania/23436>. Saiboko, A., "Muhongo unveils 'no to failure' energy plan," Daily News, 4 July 2013. <<http://archive.dailynews.co.tz/index.php/local-news/19439-muhongo-unveils-no-to-failure-energy-plan>>.

48 BG Group, Tanzania overview. <<http://www.bg-group.com/288/where-we-work/tanzania/>>.

49 "Oil and Gas Trade Mission to Tanzania," British High Commission, 10 February 2014. <<https://www.gov.uk/government/world-location-news/oil-and-gas-trade-mission-to-tanzania>>.

50 Statoil, Tanzania, January 2014. <<http://www.statoil.com/en/about/worldwide/tanzania/Pages/default.aspx>>.

51 "Tanzania: Pipeline, Oil Refinery Projects Up for Revisit," AllAfrica, 14 August 2012. <<http://allafrica.com/stories/201208140570.html>>.

52 Beach Energy, Tanzania, December 2013. <<http://www.beachenergy.com.au/irm/content/tanzania.aspx?RID=265>>; Orca, Tanzania Exploration & Production, November 2013. <<http://www>

Activity_Map_2012.pdf>.

Table 8.4: Planned midstream oil and gas projects in Tanzania

Project	Capacity (MMcf/d)	(Estimated) Start-up	Sector	Operator
Mnazi-Dar gas pipeline	784	2015	Pipeline	N/A
Madimba	200	2016	Gas processing plant	Tanzania Petroleum Development Corporation
Songo Songo (extension)	200	N/A	Gas processing plant and pipelines	Orca
Tamaza oil pipeline	N/A	N/A	Pipeline	Tazama Pipelines Ltd.
Dar-Tanga-Mombasa (Kenya) gas pipeline	N/A	Feasibility study completed in 2011	Pipeline	N/A

Note: The study concluded that the gas supplies from Songo Songo gas field alone would be insufficient to warrant building the pipeline. East African Community, "Feasibility Study for a Natural Gas Pipeline from Dar es Salaam to Tanga (Tanzania) to Mombasa (Kenya)," June 2011.

Source: see footnotes.⁵³

Table 8.5: Planned downstream oil and gas projects in Tanzania

Project	Capacity (MW)	(Estimated) Start-up	Sector	Operator
Kinyerezi 1	150	2014	Gas-fired power station	Tanzania Electricity Supply co.
Kinyerezi 2	240	2015	Gas-fired power station	Tanzania Electricity Supply co.
Kinyerezi 3	300	2016	Gas-fired power station	Tanzania Electricity Supply co.

orcaeexploration.com/operations_tanzania_exploration.asp>; Aminex PLC., March 2014. <<http://www.aminex-plc.com>>.

53 "Tanzanian pipeline construction inaugurated," Pipelines International, September 2012. <http://pipelinesinternational.com/news/tanzanian_pipeline_construction_inaugurated/077220/>; Daily News, "Gas pipeline Commissioning 2014," November 2013. <<http://www.dailynews.co.tz/index.php/local-news/24568-gas-pipeline-commissioning-2014>>; Bounty Oil & Gas NL, Kiliwani North Project Update. 28 February 2014. <<http://www.openbriefing.com/AsxDownload.aspx?pdfUrl=Report%2FComNews%2F20140228%2F01496596.pdf>>.

Mtwara	400	2017	Gas-fired power station (extension)	Symbion and GE
Lindi	N/A	2022	LNG Plant	Statoil and BG Group

Source: see footnotes.⁵⁴

8.3 Laws and regulations

Due to the relatively new status of gas as a potentially major sector in the Tanzanian economy it has not been included in national strategies, such as the Development Vision 2025. The gas sector is, however, becoming central to new planning documents and strategies.

8.3.1 Petroleum (Exploration and Production) Act (1980)

The main piece of legislation governing the upstream oil and gas sector in Tanzania is the Petroleum (Exploration and Production) Act of 1980. It is a comprehensive piece of legislation, covering the licencing, taxation and local content requirements of upstream operations. Under the 1980 Act the Ministry of Energy and Minerals (MEM) is responsible for regulating the sector, with powers to set industry-specific policies, strategies and laws.⁵⁵ It also gave MEM sole power of approval over the transfer of equity in oil and gas projects in Tanzania.⁵⁶

Licencing

The Petroleum Act sets out the terms under which licences can be granted to take part in oil and gas exploration and production operations: Section 13 details who may be granted exploration and development licences, and Section 38 includes the conditions which the licensee must meet in order to be granted a licence.⁵⁷ Exploration licences are granted for four years initially, and then can be renewed twice for four years under the first extension and three years under the second extension. Under the Petroleum Act, the typical size of an exploration licence is 60 blocks (the size of a block is defined within the Act), although under ministerial discretion this can be increased to a maximum of 200 blocks.⁵⁸

If a commercial discovery is made in the exploration phase, an application for a development licence must be made within two years, and is granted for an initial term of

54 Mhagama, H., "Tanzania: Kinyerezi 1 Electricity Project Equipment Arrives in Dar," AllAfrica, February 2013. <<http://allafrica.com/stories/201402200114.html>>; USEA, Current Status of Energy Sector in Tanzania, February 2013. <<http://www.usea.org/sites/default/files/event-/Tanzania%20Power%20Sector.pdf>>; 2b1st Consulting, "Tanzania to monetize gas with power plant and downstream industries," July 2013. <<http://www.2b1stconsulting.com/tanzania-to-monetize-gas-with-power-plant-and-downstream-industries/>>; Holter, M., "Statoil, BG to Build Tanzania LNG Plant in Lindi, Minister says," Bloomberg, 14 February 2014. <<http://www.bloomberg.com/news/2014-02-14/statoil-bg-to-build-tanzania-lng-plant-in-lindi-minister-says.html>>.

55 Freshfields, "Tanzania Oil and Gas," March 2013. <http://www.freshfields.com/uploadedFiles/SiteWide/News_Room/Insight/Africa_ENR/Tanzania/Tanzania%20oil%20and%20gas.pdf>.

56 Ibid.

57 United Republic of Tanzania, Petroleum (Exploration and Production) Act, 1980, §§13 & 38. <<http://www.tpdc-tz.com/psaandact1980.pdf>>.

58 Ibid. §20.

25 years, with the possibility of an extension for 20 years upon its expiration.⁵⁹

Taxation

The Petroleum Act states in Section 81 that the registered holder of a development licence is obliged to pay royalty to the Government, subject to the terms set out in each individual licence.⁶⁰

Domestic supply obligations

Section 40.2 obliges holders of development licences to supply the domestic requirements of Tanzania ahead of any exports.⁶¹

8.3.2 National natural gas policy

The success of natural gas exploration has triggered a wide-reaching political debate on the economy and national development in Tanzania, to which the Government has responded with its National Natural Gas Policy, which was approved by the nation's cabinet in October 2013.⁶² Although it is not yet legally binding, the Policy sets out the Government's vision for the midstream and downstream hydrocarbon industry in the country, and the regulatory framework intended to prepare Tanzania to become a major producer of natural gas. The Government aims to bring the National Natural Gas Policy into force during 2014.⁶³ The fundamental policy issues and strategies discussed in the document are as follows:⁶⁴

Development of natural gas infrastructure

- The Government will utilise its national companies to participate "strategically" in the development of major infrastructure
- Natural gas infrastructure will serve both domestic and export markets
- Transparent and non-discriminatory terms will be developed to ensure third-party access to gas infrastructure.

Natural gas for the domestic and export markets

- The domestic market will be given priority over the export market

59 Freshfields, "Tanzania Oil and Gas," March 2013. <http://www.freshfields.com/uploadedFiles/SiteWide/News_Room/Insight/Africa_ENR/Tanzania/Tanzania%20oil%20and%20gas.pdf>.

60 United Republic of Tanzania, Petroleum (Exploration and Production) Act, 1980, §81. <<http://www.tfdc-tz.com/psaandact1980.pdf>>.

61 Ibid. §40.2

62 Clyde & Co., "The national natural gas policy of Tanzania," November 2013. <http://www.clydeco.com/uploads/Files/Publications/2013/MEBE_-_017_-_The_national_natural_gas_policy_for_Tanzania_-_Eng_-_Dec2013.pdf>.

63 Ng'wanakilala, F., "Tanzania's cabinet approves final natural gas policy," Reuters, November 2013. <<http://www.reuters.com/article/2013/11/19/tanzania-gas-policy-idUSL5N0J43ZL20131119>>.

64 United Republic of Tanzania, "The National Natural Gas Policy of Tanzania – 2013," §3.1, October 2013. <http://www.tanzania.go.tz/egov_uploads/documents/Natural_Gas_Policy_-_Approved_sw.pdf>.

- A national company will be established as a “natural gas aggregator”, with comprehensive powers over the country’s mid- and downstream natural gas sectors, in order to “ensure efficiency and reliable supply of natural gas”.

Management of natural gas revenue

- A National Gas Revenue Fund will be established, and guidelines for its use developed through a “national dialogue”.

Natural gas pricing

- Legislation will ensure that both supply and demand are met, and that gas will remain affordable on both the corporate and domestic level.

Security of natural gas infrastructure and supply

- Investment in national gas infrastructure will be optimised to ensure a reliable supply
- Capability of National Security institutions will be enhanced to ensure material safety of infrastructure.

Linkages with other strategic sectors

- Private sector participation in the development of energy intensive industries will be supported.

Local content and capacity building

- See Section 8.3.4; however, it is notable that the phrasing of earlier drafts, which had been stringent on matters of local content, has been softened in the final draft to “working with” IOCs.

Corporate Social Responsibility

- All investors and contractors will be under contractual obligation to undertake community development programmes, and submit CSR action plans to the “appropriate authority”.

It is notable that the policy has been altered to become more “investor friendly” in the various drafts.⁶⁵ However, the laws mandated by the policy may increase regulatory burdens on firms, and local content is one area in which the government is likely to exert considerable pressure on international companies.

The “five pillars” which underpin the National Natural Gas Policy and express its overall aims are:⁶⁶

65 Clyde & Co., “The national natural gas policy of Tanzania,” November 2013. <http://www.clydeco.com/uploads/Files/Publications/2013/MEBE_-_017_-_The_national_natural_gas_policy_for_Tanzania_-_Eng_-_Dec2013.pdf>.

66 United Republic of Tanzania, “The National Natural Gas Policy of Tanzania – 2013,” §2.2, October 2013.

- Optimization of benefits to the Government and the people of Tanzania through strategic participation, interventions and equitable benefit sharing
- Development and strengthening of institutional framework and human capacity to ensure an efficient and sustainable natural gas industry
- Ensuring a transparent and accountable system is in place for managing natural gas revenue and developing the natural gas industry
- Ensuring adequate disaster management systems exist to prevent adverse impacts and protect people's health and safety, and the environment
- Promotion and facilitation of the integration of the natural gas industry and other economic sectors in the country, in order to accelerate broad based growth and socio-economic transformation.

Since the Policy's emphasis has been changed to exclude the upstream sector, it does not address the need to restructure some government institutions, such as the Tanzania Petroleum Development Corporation (TPDC).⁶⁷ TPDC currently holds the conflicting roles of industry player and regulator (see Section 8.4.2). The TPDC may be split to balance the two roles, or industry regulation may be passed on to the Energy and Water Utilities Regulatory Authority (EWURA), which already has some power in the oversight of the upstream oil and gas sectors.⁶⁸

8.3.3 New Model Production Sharing Agreement (2013)

In 2013, the Tanzanian Government published its new Model Production Sharing Agreement (MPSA) for companies in the oil and gas sector, which took effect as of the fourth bidding round. The bidding round was opened on 25th October 2013. Crucially, the document states that the second party signatory to the agreement must be "a company existing under the Laws of the United Republic of Tanzania, with office and legal representative in the United Republic of Tanzania."⁶⁹ The MPSA defines the signatory's role as that of a contractor who conducts oil and gas exploration and production activities on behalf of TPDC. It allows the exploration and production company to recover its costs, and then share additional "Profit Oil" and "Profit Gas" with TPDC. The new MPSA attempts to secure state income and national development from the country's national resources in the following ways:⁷⁰

- A bonus of at least USD 2.5 million must be paid when the agreement is signed, followed by a bonus of at least USD 5 million when production commences

⁶⁷ <http://www.tanzania.go.tz/egov_uploads/documents/Natural_Gas_Policy_-_Approved_sw.pdf>.

⁶⁸ Clyde & Co., "The national natural gas policy of Tanzania," November 2013. <http://www.clydeco.com/uploads/Files/Publications/2013/MEBE_-_017_-_The_national_natural_gas_policy_for_Tanzania_-_Eng_-_Dec2013.pdf>.

⁶⁹ Ng'wanakilala, F., "Tanzania says to restructure oil, gas regulator," Reuters, September 2012. <<http://www.reuters.com/article/2012/09/25/ozabs-tanzania-gas-idAFJOE88002L20120925?sp=true>>; Masebu, H. and Borgstrom, R., "The Role of the Independent Regulator in Tanzania's Natural Gas and Petroleum Sectors," IP3's Infrastructure Regulation Information Series, October 2006. <http://www.ip3.org/ip3_site/the-role-of-the-independent-regulator-in-tanzania-s-natural-gas-and-petroleum-sectors.html?print=1&tmpl=component>.

⁷⁰ Model Production Sharing Agreement between The Government of the United Republic of Tanzania and Tanzania Petroleum Development Corporation, 2013. <[http://www.tpdc-tz.com/Model%20Production%20Sharing%20Agreement%20\(2013\).pdf](http://www.tpdc-tz.com/Model%20Production%20Sharing%20Agreement%20(2013).pdf)>.

⁷⁰ Ashurst, "New production sharing agreement for Tanzania," November 2013. <www.ashurst.com/doc.aspx?id_Content=9819>.

- The signatory must spend USD 500,000 per annum on skills transfer and training initiatives for the indigenous workforce
- The Government must receive royalties from the signatory at the rate of 12.5 per cent for onshore areas, and 7.5 per cent for offshore, of the total crude oil or natural gas production prior to the recovery of costs
- General taxation applies to the exploration and production company's income, as well as an "Additional Profits Tax" calculated in accordance with the MPSA's provisions
- Provisions are made for the signatory to accord with local content law. This reflects pressure from within Tanzania, and also from bodies such as the European Commission, for more value from its resources to reach its local people through the formulation of a formal Local Content Policy
- Similarly, in order to enhance transparency, a clause has been included to address bribery and corruption. Another clause gives the Central Bank of Tanzania and the Minister the right to audit the bank accounts of the contractor.

8.3.4 Local content law

Both the Petroleum Act of 1980 and the National Natural Gas Policy have a bearing upon the issue of local content. Section 20.1.c.v of the Petroleum Act requires that applications for exploration licences be accompanied by a plan for the employment and training of Tanzanian citizens. Sections 36.b and 38.1.d assign the same obligation to holders of development licences.⁷¹ Requirements are not clearly specified for either type of licence, however.

Local content requirements are similarly vague in the National Natural Gas Policy. According to the Policy's provisions, the Government of Tanzania shall:⁷²

- Work with international oil and gas companies to ensure opportunities for the supply of goods and services, employment and investments are made available to Tanzanians.
- Work with international oil and gas companies to ensure that the capacity of Tanzanians is developed in the natural gas value chain through skills development, transfer of technology and applied research.
- Strengthen the capacity of the national oil company to participate strategically in the natural gas industry.
- Work with international oil and gas companies to explore possibilities that companies participating in the natural gas value chain are listed on the Dar es Salaam Stock Exchange.
- Establish an oil and natural gas centre of excellence and strengthen capacity of the training institutions to impart requisite knowledge, skills and innovations to Tanzanians.

⁷¹ United Republic of Tanzania, Petroleum (Exploration and Production) Act, 1980, §§20.1.c.v, 36.b, 38.1.d. <<http://www.tpdc-tz.com/psaandact1980.pdf>>.

⁷² United Republic of Tanzania, "The National Natural Gas Policy of Tanzania – 2013," §3.1.7, October 2013. <http://www.tanzania.go.tz/egov_uploads/documents/Natural_Gas_Policy_-_Approved_sw.pdf>.

8.4 Operators and concessionaires

8.4.1 International oil companies (IOCs)

As the gas sector in Tanzania is relatively new, there is insufficient local expertise and capability in the sector, which is consequently dominated by the IOCs. There are currently 16 IOCs involved in the oil and gas sector in Tanzania, including BG Group, Statoil, Petrobras, Shell and ExxonMobil.⁷³ Tanzania's fourth licensing round, which was launched on 25th October 2013, offered seven deep offshore blocks and one onshore block for oil and gas exploration.⁷⁴ The blocks include offshore blocks that are located next to large gas discoveries made by BG Group and Statoil in 2010. Table 8.6 details the activities of international companies in the Tanzanian oil and gas sector.

Table 8.6: Major IOCs active in Tanzania

Company	Projects	Details
BG Tanzania	Blocks 1, 3 and 4	<p>BG is the operator and 60 per cent owner, in partnership with Ophir and TPDC of the three blocks. Since its inception, the joint venture has acquired over 13,000km² of 3D seismic data. The joint venture has had 11 consecutive drilling successes, including nine gas discoveries and two appraisal wells. The exploration and appraisal activity has led to estimates of total gross resources of approximately 13 tcf and further exploration and appraisal activity is planned for 2014.</p> <p>BG Tanzania and Statoil are in the advanced stages of planning for a prospective onshore LNG processing and export facility. The two companies are leading the gas industry and are expected to start exporting LNG in the early 2020s.</p>
Statoil	Block 2	<p>Statoil is the operator and 65 per cent owner, in partnership with ExxonMobil, who holds 35 per cent equity.</p> <p>Statoil also holds a 12 per cent share in offshore Block 6, operated by Petrobras. Following the discovery of recoverable resources of up to 17 tcf of gas in Block 2, Statoil is one of the most successful companies operating in Tanzania and expects to produce Tanzanian gas in the early 2020s.</p>

⁷³ "Tanzania anticipates fivefold increase in gas reserves by 2015," Reuters, 21 Aug 2013. <<http://www.reuters.com/article/2013/08/21/tanzania-naturalgas-idUSL6N0GM2TE20130821>>.

⁷⁴ United Republic of Tanzania, The 4th Tanzania Offshore Licensing Round, October 2013. <<http://www.tz-licensing-round.com>>.

PanAfrican Energy (PAE)	Songo Songo gas field Ubongo power plant	PAE is a near shore natural gas field operator. It is a subsidiary entirely owned by Orca Exploration Group Inc. PAE has been in the Tanzanian market since 2001, operating the Songo Songo natural gas field.
Maurel et Prom Tanzania	Mnazi Bay Field	French company Maurel et Prom operate the Mnazi Bay gas field, in conjunction with Wentworth Resources and TPDC. Maurel et Prom holds 48.06 per cent equity in the field's production, while Wentworth and TPDC hold 31.94 per cent and 20 per cent respectively. TPDC is not involved with the exploration side of the operation, which is split between Maurel et Prom (60.075 per cent) and Wentworth (39.925 per cent).
ExxonMobil	Block 2	ExxonMobil, through its subsidiary ExxonMobil Exploration and Production Tanzania Ltd., holds a 35 per cent interest in Statoil's offshore Block 2.
Ndovu Resources	Nyuni field Rovuma field Songo-dar pipeline	Ndovu Resources, a fully owned subsidiary of Aminex PLC, is a near-shore exploration company currently involved in production sharing agreements in Nyuni and the Rovuma fields. The Nyuni PSA has the potential for 2.8 tcf of gas. Ndovu has access rights to the Songo-Dar es Salaam pipeline and will likely supply the domestic market if projects are successful.
Petrobras	Blocks 5, 6 and 8	Petrobras is currently involved in deep-sea exploration in three offshore blocks in Tanzania, but has not met with success comparable to BG Group or Statoil. Petrobras farmed out 12 per cent of Block 6 to Statoil in May 2013, as part of its efforts to shed assets and shore up its failing cash flow.
Ophir	Blocks 1, 3, 4, 7 and East Pande	Ophir has interests in five blocks and it operates two of the blocks. Ophir has a 40 per cent interest in Blocks 1, 3 and 4; an 80 per cent operating interest in Block 7; and a 70 per cent operating interest in East Pande. Ophir was one of the first firms to hold assets in Tanzania.
Beach Petroleum	Lake Tanganyika South Block	Beach Petroleum is a small Australian company exploring the prospective Lake Tanganyika South Block, in which it has held 100 per cent equity since 2010. The exploration firm is likely to be taken over if oil reserves are proven.
Dodsal	Ruvu Block	Indian company Dodsal is concerned with onshore gas exploration and is the owner of the Ruvu Block. The company has not yet commenced drilling, but was planning to drill a well by early 2014.

Shell	Blocks 5, 6, 8, 9, 10, 11 and 12	Shell is the owner of offshore Blocks 9-12. In August 2013 Shell signed a Memorandum of Understanding with the Government of Zanzibar, which broke a long term deadlock on Blocks 9-12. Seismic surveys of the highly prosperous assets were expected to begin in the fourth quarter of 2013. The company is a non-operating partner in Blocks 5, 6 and 8, in collaboration with Petrobras.
Heritage Rukwa Ltd	Rukwa North and South Kyela Latham	Heritage Rukwa Ltd has 100 per cent working interest and acts as operator for Rukwa North, Rukwa South (since November 2011) and Kyela (since January 2012). It is also the operator for Latham and holds a 29.9 per cent working interest there.

Sources: see footnotes.⁷⁵

8.4.2 National oil companies

Tanzania relies on Modeal Production Sharing Agreements (MPSAs) (see Section 1.3.3) as the basic framework for negotiations between foreign oil and gas companies and the Ministry of Energy and Minerals (MEM) and Tanzania Petroleum Development Corporation (TPDC). The Government hopes to encourage the development of small and marginal discoveries, while obtaining a higher share of profits from the more lucrative fields. MEM also seeks to satisfy national objectives such as training and employment. Table 8.7 describes the MEM and the TPDC and their activities within the sector in Tanzania.

75 BG Group, Tanzania overview. <<http://www.bg-group.com/OurBusiness/WhereWeOperate/Pages/Tanzania.aspx>>; Statoil, Tanzania, January 2014. <<http://www.statoil.com/en/about/worldwide/tanzania/Pages/default.aspx>>; PanAfrican Energy, Production. <<http://www.panafricanenergy.com/operations/production/>>; Wentworth Resources Ltd., Mnazi Bay PSA. <<http://www.wentworthresources.com/tanzania.php>>; "New high-impact discovery offshore Tanzania," Statoil, 18 March 2013. <http://www.statoil.com/en/NewsAndMedia/News/2013/Pages/18Mar_Tanzania.aspx>; Aminex PLC, Aminex in Tanzania. <<http://www.aminex-plc.com/projects/tanzania>>; Petrobras, Tanzania. <<http://www.petrobras.com/en/countries/tanzania/tanzania.htm>>; Ophir Energy. <<http://www.ophir-energy.com>>; Beach Energy, Tanzania, December 2013. <<http://www.beachenergy.com.au/irm/content/tanzania.aspx?RID=265>>; Shell. <<http://www.shell.com>>; Doscal. <<http://www.dosal.com/aboutus/the-dosal-group.shtml>>; Heritage Oil PLC, "Annual Report 2012," April 2013. <<http://www.heritageoilplc.com/investor-relations/annual-report-2012/asset-overview.aspx>>.

Table 8.7: Government institutions involved in the Tanzanian oil and gas sector

Name	Overview
Ministry of Energy and Minerals (MEM)	<p>MEM is mandated to facilitate the development of the energy and mineral sectors in Tanzania through policies and plans for sustainable use. MEM is involved in numerous projects including:</p> <ul style="list-style-type: none"> • Mnazi-Dar gas pipeline • ‘Big Results Now’ power generation and transmission overhaul • Drafting of the Natural Gas Policy and development of natural gas regulatory and legal regime • Regional power pooling.
Tanzania Petroleum Development Corporation (TPDC)	<p>TPDC is the Tanzanian state corporation through which the MEM implements its petroleum exploration and development policies. It is currently in the 4th licensing round, offering offshore and Lake Tanganyika Blocks for tender. TPDC is involved in several on-going projects, most notably the Songo Songo gas project and the Mnazi Bay gas project.</p> <p>The future of TPDC’s role in the sector is uncertain at present: under the current regulatory regime it both participates in the gas sector as a state-owned company and regulates the sector, leading to a conflict of interests. A key political milestone in the development of the gas economy will be a split of TPDC into a new national oil company and a new regulator. Alternatively, the TPDC may hand over its regulatory duties to EWURA (see Section 8.3.2).</p>

Sources: United Republic of Tanzania, Ministry of Energy and Minerals. <<http://www.mem.go.tz/>>; United Republic of Tanzania, Tanzania Petroleum Development Corporation. <<http://www.tpdc-tz.com/tpdc/>>.

Tanzania Petroleum Development Corporation (TPDC)

TPDC was established under the Public Corporations Act No. 17 through the Government Notice No. 140 in May 1969, and it began operations in 1973.⁷⁶ It has a workforce of approximately 130 employees and it is organised into four directorates: Exploration, Production and Technical services; Finance and Administration; Marketing and Investment; and Managing Director.⁷⁷ The corporation holds shares in the Songo Songo Gas to Electricity project and Mnazi Bay gas development projects. The TPDC’s shares in the TIPER refinery, the oil companies BP and Oryx, and the Tazama Pipeline have been transferred to the Ministry of Finance.⁷⁸

⁷⁶ Tanzania Petroleum Development Corporation, Historical Background. <http://www.tpdc-tz.com/tpdc/Historical_background.php>.

⁷⁷ Ibid., About Us. <http://www.tpdc-tz.com/tpdc/About_Us.php>.

⁷⁸ Ibid.

Joint ventures (JV) and production sharing contracts (PSC)

As described in Section 8.3.3, oil and gas operations in Tanzania take place under the terms of MPSAs, in which the exploration and development of the country's natural resources are contracted out by TPDC to IOCs. The standard provisions for MPSAs were revised in November 2013 in an attempt to maximise the benefit of the exploitation of oil and gas to Tanzania's economy. MPSAs are the general models which are used as a template for particular PSCs. The first PSC was signed by Azienda Generale Italiana Petroli, who joined Amoco in 1973 to drill three onshore and two offshore wells, including the well at Songo Songo in 1974.⁷⁹ Up to December 2012, 26 PSCs had been signed with 18 different oil exploration companies.⁸⁰ Several more can be expected as a result of the licencing round launched in October 2013.

8.5 International suppliers

Siemens and ABB have offices in Tanzania, but as natural gas production increases, more suppliers will be drawn into the country. No other major engineering companies have offices in Tanzania.

8.5.1 Upstream

Sakson Group

In order to increase the production from the gas field, Orca Exploration contracted the Sakson PR5 drilling rig as part of its USD 130 million investment in the field. The drilling rig was intended to help increase the field's gas production capacity, from 113 MMcf/d to more than 250 MMcf/d.⁸¹ Sakson Group is an Egyptian drilling contractor who specializes in the operation and management of drilling rigs.⁸²

Caroil

In 2007, Aminex subsidiary Ndovu Resources, which operates offshore of Songo Songo Island, received the Caroil Rig-6 drilling rig to drill a development well.⁸³ Caroil is a drilling and work-over subsidiary of Maurel & Prom, and was acquired by Tuscany International Drilling Inc. in 2011.⁸⁴

Hyundai Heavy Industries

Hyundai Heavy Industries delivered the Deepsea Metro I oil rig in 2011 for BG's operations

79 Ibid., Exploration History. <http://www.tpdc-tz.com/tpdc/directorate/exploration/Exploration_History.php>.

80 United Republic of Tanzania, "The National Natural Gas Policy of Tanzania – 2013," §1.2, October 2013. <http://www.tanzania.go.tz/egov_uploads/documents/Natural_Gas_Policy_-_Approved_sw.pdf>.

81 Orca Exploration, "Orca Exploration announces arrival of drill rig to begin \$130 million Songo Songo field expansion," 16 November 2011. <http://www.orcaexploration.com/news_11_15_nov.asp>.

82 Sakson Group, History. <<http://saksongroup.com/about-us/history/>>.

83 "Aminex Signs Rig Contract for Nyuni/East Songo Songo," Rigzone, 3 April 2007. <http://www.rigzone.com/news/oil_gas/a/43442/Aminex_Signs_Rig_Contract_for_Nyuni_East_Songo_Songo>.

84 "Maurel & Prom - Caroil SA to be Merged with Tuscany International Drilling Inc.," PR Newswire, 21 June 2011. <<http://www.prnewswire.com/news-releases/124253129.html>>.

in Block 1.⁸⁵

8.5.2 Midstream

Inchcape Shipping Services

The new 512 km Mnazi-Dar pipeline will be able to transport 784 MMcf/d of gas. Tanzania agreed to a loan agreement for USD 1.2 billion from the Export-Import Bank of China with a 33 year maturity and 2 per cent interest rate. Construction began in November 2012 and is expected to be completed in 2014. China Petroleum Technology & Development Corporation and China Petroleum Pipeline Engineering Corporation are implementing the project.⁸⁶ Inchcape Shipping Services were awarded a contract to support the construction of the pipeline. A unique custom built pipe laying vessel is being used.⁸⁷

8.5.3 Downstream

Siemens

For the expansion of Tanzania's power generation capacity at Ubungo power plant, Siemens supplied three SGT-800 gas turbines with a combined capacity of 100 MW.⁸⁸

Alstom

In 2003, Alstom was awarded a EUR 13 million (USD 17.8 million) contract to upgrade GT10A turbines units at the Ubungo Power Station. Alstom's industrial gas turbine facility in Sweden provides the new gas turbines for the Songo Songo Gas Development and Power Generation Project.⁸⁹

ABB

The Ubungo power station utilizes ABB's GT10 gas turbines. They initially used liquid fuels, but were later upgraded and converted to use natural gas.⁹⁰ As part of the USD

⁸⁵ Rigzone, Rig Data: Deepsea Metro I. <http://www.rigzone.com/data/offshore_drilling_rigs/1539/Drillship/Odfjell/Deepsea_Metro_I>.

⁸⁶ "No. 01: Mtwara - Dar Gas pipeline Construction," Pesa Times, 2013. <<http://www.pesatimes.com/news/top-20-tanzania-business-stories-of-2012/mtwara-dar-gas-pipeline-construction>>; "Tanzanian pipeline construction inaugurated," Pipelines International, September 2012. <http://pipelinesinternational.com/news/tanzanian_pipeline_construction_inaugurated/077220/>.

⁸⁷ Priestly-Eaton, H., "ISS celebrates Dar es Salaam contract," Energy Global, 20 January 2014. <http://www.energyglobal.com/news/pipelines/articles/ISS_celebrates_Dar_es_Salaam_contract.aspx#.Uzwfs6hdWig>.

⁸⁸ "Siemens to supply gas turbines for Ubungo power plant in Tanzania," Spencer Ogden Power, 12 July 2011. <<http://www.sopower.co.uk/news/siemens-to-supply-gas-turbines-for-ubungo-power-plant-in-tanzania-news-11931210111>>.

⁸⁹ "ALSTOM awarded order for modernisation of power station in Tanzania," Alstom, 3 January 2012. <<http://www.alstom.com/press-centre/2003/2/ALSTOM-awarded-order-for-modernisation-of-power-station-in-Tanzania-20030225/>>.

⁹⁰ GE, Distributed Generation for a developing nation. <<http://www.ge-spark.com/spark/songas/en/project-timeline/>>; Gryphon, Ubungo Gas Turbine Power Plant Expansion. <<http://www.gryphoneng.com/>>.

250 million Songo Songo Gas Development and Power Generation Project, ABB was contracted to modernise the two GT10A turbine generator units which were installed in 1994, by supplying a new GT10B2 gas generator, power turbine and control system for each unit, incorporating fuel conversion from oil to gas to accommodate the new local gas supply.

GE and Symbion Power

The Ubungo gas power station utilizes GE's LM6000 turbines, which with ABB's gas turbines, were upgraded to use natural gas. GE has signed an agreement to help build the Mtwara gas power station.⁹¹

The Tanzania National Electrical Supply Company awarded a contract to a consortium of Symbion Power and GE for the design of the Mtwara Power plant. It is a Public Private Partnership in which the US consortium provides technology expertise. The total expenditure of the power plant project amounts to USD 1 billion, with which a 400 MW gas-fired power plant would be built in Mtwara together with 650km power line.⁹²

8.6 Future opportunities for international suppliers

The key conclusions from the country analysis are as follows:

- Tension with Zanzibar, poor electricity connection, bureaucracy and corruption are problematic factors for businesses.
- No oil reserves have been found. Lake Tanganyika is a prospect under exploration for oil. An oil pipeline runs to Zambia.
- The Songo Songo gas field is the main production source. Most blocks are being explored and appraised, 19 blocks are being explored and more blocks are up for sale.
- Gas is already being used for domestic consumption and further mid- and downstream developments are planned or under construction. No gas is exported but if the resources are sufficient then the export market is likely to be similar to Mozambique's.
- National Natural Gas Policy is due in 2014. Newer drafts are aimed at being more investor friendly.
- Production Sharing Contracts have high one-off fees.
- Local content requirements are vague with no specific figures.
- Institutional changes to the TPDC look set to be enacted.

Key opportunities in Tanzania identified by UK trade and investment and from the discussion above include:⁹³

com/projects/1275-Gry.pdf>.
91 "GE signs deal with Tanzania to help build 400 MW power plant," Reuters, 21 June 2013. <<http://www.reuters.com/article/2013/06/21/tanzania-electricity-idUSL5N0EX0P120130621>>.

92 "Construction on Mtwara gas plant project starts," Daily News, 7 July 2013. <<http://www.dailynews.co.tz/index.php/local-news/19592-construction-on-mtwara-gas-plant-project-starts>>; "GE signs deal with Tanzania to help build 400MW power plant." Reuters, 21 June 2013. <<http://www.reuters.com/article/2013/06/21/tanzania-electricity-idUSL5N0EX0P120130621>>.

93 UK Trade and Investment, Oil & Gas sector in Tanzania, 31 May 2013. <http://www.ukti.gov.uk/pt_pt/

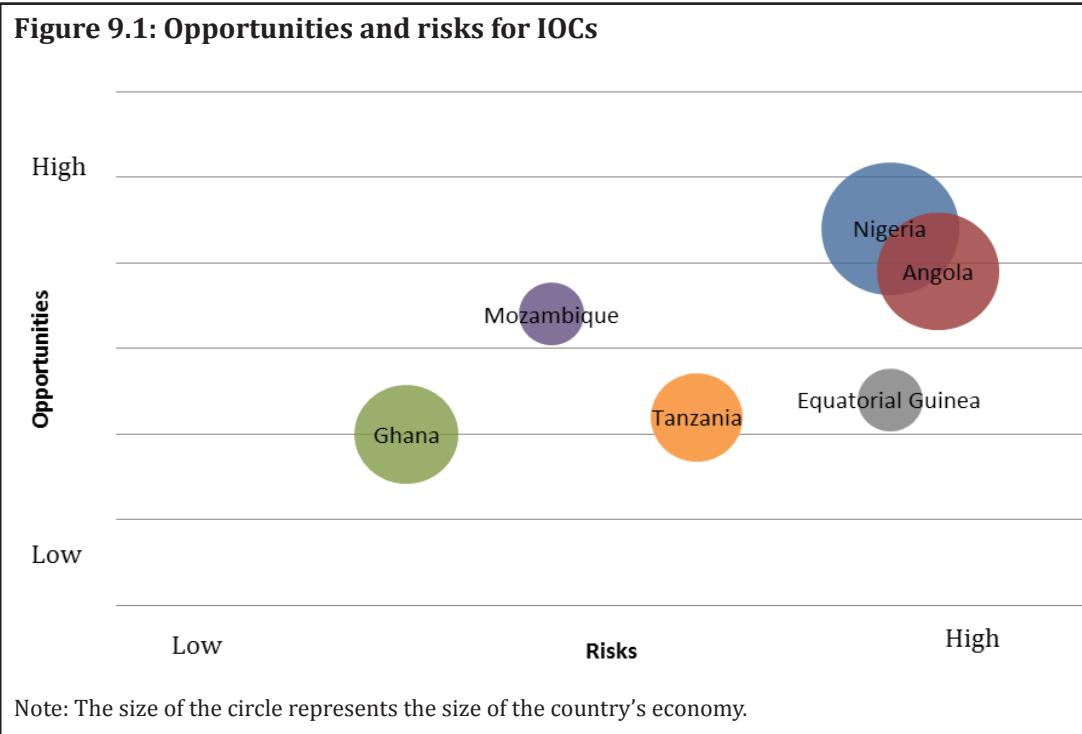
- Design and construction of drilling rigs
- Construction of an LNG plant and export facilities
- Gas processing plants renovation and maintenance, which include the expansion of the Songo Songo gas plant
- Supply of high efficiency gas turbines, parts and services
- Developments of the Kinyerezi power stations and construction of the Mtwara power station
- Construction of gas and oil distribution networks
- Supply and installation of gas and oil transmission equipment
- Engineering works
- Training and development including technical training
- Supply of chemicals and lab equipment.

9. Conclusion and country comparisons

As a conclusion of this report, we have compared the countries discussed in the report, in terms of opportunities and risks for both IOCs and international suppliers, to contribute to further understanding the nature of conducting business in those countries and the region as a whole.

9.1 International oil companies

We have compared the countries discussed using a variety of factors to produce an illustrative indication of the perceived opportunities and risks in those countries for IOCs (see Figure 9.1). The comparisons have been based upon a combination of statistical data, other indices and the discussion presented in our report. See Appendix III for the variables used to assess the opportunities and risks.



The opportunities and risk indices are given in Table 9.1 and Table 9.2. Proven reserves were given a heavier weight due to their importance for IOCs. However, proven reserves are insufficient alone to measure opportunities as proven reserves are low in certain countries where the opportunities in the oil and gas sector are high, particularly in Mozambique and Tanzania.

Table 9.1: Opportunities indices for IOCs

Measure	Description
Proven reserves	Proven oil and gas reserves in the country. Gas has been converted to oil by using the barrel of oil equivalent (BOE).
Potential reserves	Potential future oil and gas reserves predicted for the country. The statistics for probable and possible reserves are difficult to estimate and are limited to particular fields once discovered. However, estimates from various sources have been collected to produce the index.
Developments	Oil and gas projects that have been planned or are under construction.
Exploration activity	The intensity of exploration taking place and the level of successful discoveries.

Table 9.2: Risks indices for IOCs

Measure	Description
Political stability and security	The likelihood of oil and gas operations interrupted due to political events or security threats.
Corruption	The prevalence of corruption, especially with regard to the extractive industries.
Business environment	The difficulties that international companies face when conducting business. These include tax, local business partners, infrastructure and regulations.
Regulatory demands and uncertainty	The demands and uncertainty of legislation relevant to the oil and gas industry, including tax and local content laws.
Technical risk	The technical risks of oil and gas operations. Remote offshore operations are high risk. Overcoming technical risks can lead to the cost for recovering oil and gas overrunning.
Oil and gas prices	The uncertainty of oil and gas prices can make it difficult for IOCs to judge if a venture is commercially viable. Offtake agreements could mitigate the effects of the rapid and uncertain changes in price by ensuring returns on oil and gas production.

Our findings for IOCs are summarised as follows: Nigeria and Angola are clearly set apart from the other sub-Saharan African nations in terms of oil and gas opportunities. It is well documented that their level of proven resources and production levels surpass any

other sub-Saharan African nation. Nonetheless, the risks in both of these countries are comparatively high. In fact, some of the socio-political problems are derived from the oil and gas wealth. Nigeria and Angola have more complicated, uncertain and demanding oil and gas legislation.

Mozambique, Tanzania and Equatorial Guinea are medium to high risk countries. Equatorial Guinea is maligned by corruption and sets demanding legal, especially financial, requirements on international companies. Whilst the oil and gas opportunities were plentiful in the last decade, it is not clear how many new oil and gas discoveries will be made in Equatorial Guinea.

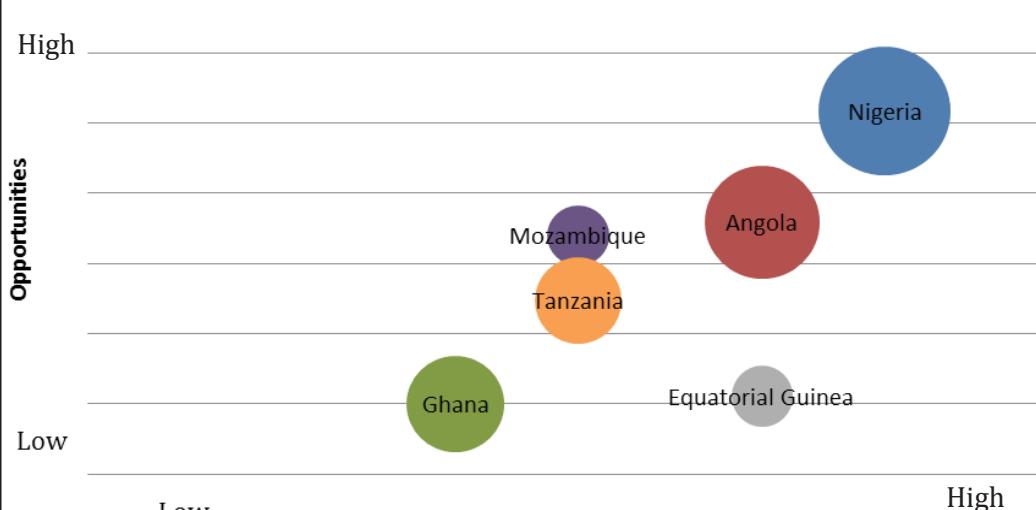
Mozambique will be a major natural gas producer in the next few years and Tanzania is likely to follow the same pattern of growth as Mozambique, although the potential reserves are suspected to be lower in Tanzania. Mozambique has more potential opportunities, as shown in Figure 9.1, as the estimated reserves are very high and IOCs are intensively exploring and developing Mozambique's gas concessions and fields. However, Mozambique and Tanzania face corruption, political instability and an uncertain future for natural gas legislation.

Opportunities are not as well-established in Ghana, with fewer reserves and a lower level of exploration activities taking place. However, it can be seen that Ghana poses far fewer risks to international companies as it is safer, less corrupt, has a better infrastructure and is easier to conduct business in compared to the other nations examined in this report.

9.2 International suppliers

An indication of the perceived opportunities and risks for international suppliers in the six countries of study is given in Figure 9.2.

Figure 9.2: Opportunities and risks for international suppliers



Note: The size of the circle represents the size of the country's economy.

Opportunity indices are given in Table 9.3. The fundamental difference between IOCs and international suppliers is that once they have set up operations in the country concerned, the latter find opportunities not only in oil and gas but also in other sectors, notably the power sector. Similarly, development of downstream industries, including domestic use of gas, will benefit international suppliers, whereas for IOCs the best scenario is to export oil and gas to international markets with fewer risks and for higher prices or profits. Poor infrastructure is an obstacle to IOCs. However, the lack of infrastructure represents opportunities for international suppliers in financial terms, as infrastructure construction will be included in the payment by the project proponent who the supplier is in a contract with. The methodology accounts for this difference. Two other indices - infrastructure and population - were added together and multiplied by the level of oil and gas opportunities which were calculated for IOCs, to determine the level of opportunity in the country for international suppliers.

Table 9.3: Opportunity indices for international suppliers

Measure	Description
Oil and gas opportunities	The total figure arrived at for IOCs was manipulated to be used for international suppliers.
Infrastructure	Insufficient infrastructure and low electrification rates provide international suppliers with opportunities in downstream oil and gas operations and other sectors.
Population	A large population has a higher potential for demanding the products and services of manufacturers.

International suppliers face similar risks to IOCs. The notable difference is that the technical risk is much lower for international manufacturers than for IOCs. Also, in general, the magnitude of the risk is much lower for international manufacturers since the scale of their investment in a project is much smaller. International manufacturers can establish a more sustainable business in the market with a long-term future. The risk indices are listed in Table 9.4.

Table 9.4: Risk indices for international suppliers

Measure	Description
Political risk	The likelihood of construction interrupted by political events in the country.
Security	The potential threat from crime and terrorist attacks. Security companies can be contracted to mitigate the risk but will not be sufficient in all cases.
Corruption	The prevalence of corruption.
Local partner and human resources	The uncertainty of local content law applied to international suppliers for the oil and gas industry, finding a stable local business partner and the availability of human resources for construction, installation and maintenance.

Much of the commentary on individual countries for IOCs in Section 9.1.1 also applies to international suppliers. Additional comparisons and commentary specific to international suppliers based on Figure 9.2 is given below.

The presence of international suppliers for the oil and gas industry is well established in Nigeria and Angola. Due to the scale of the oil and gas industry, opportunities for suppliers are plentiful. Nigeria has many opportunities because of its large domestic population, abundant oil and gas resources and low electrification rates. Angola is closer to Nigeria in terms of opportunities in the graphs for international suppliers compared to IOCs. Despite Angola's smaller population, the poor quality, post-civil war infrastructure and the large oil and gas reserves, offers international suppliers with areas to expand to beyond oil and gas production. The strategy for international companies will need to be adaptable in Nigeria and Angola as oil companies have to procure parts and services from domestic suppliers increasingly. Opportunities in these two countries are likely to be sustained through continued upstream discoveries and further monetisation of oil and gas resources through mid- and downstream projects.

Figure 9.2 shows that Tanzania and Mozambique are medium risk and present many opportunities to international suppliers, particularly when the estimated level of gas reserves is factored in. Tanzania has a large population, along with a strong record in the tourism and services sectors, providing a large market for international suppliers, which accounts for the increased level of opportunity for international suppliers comparatively to IOCs. Mozambique has a greatly different position in the graphs as current proven reserves are very low compared to potential reserves. In addition, Mozambique's high level of opportunities for international suppliers is attributable to both the LNG developments forecasted in the future and the need to rebuild the infrastructure across the country. The change in Mozambique and Tanzania from proven to potential reserves shows that the oil and gas industry is only just taking off in these countries but that opportunities are ever-growing.

Equatorial Guinea has a small population but a very large oil and gas industry. Equatorial Guinea is low risk, although the potential for corruption is high. There is less opportunity to expand beyond serving for oil and gas companies compared to the other countries.

Ghana is comparatively well-developed, with high levels of industry and electrification, hence the comparatively lower levels of opportunity, but is strategically a well-placed nation for international suppliers looking to work in West Africa with a significant pool of its own opportunities in a business friendly environment.

10. Appendices

10.1 Appendix I - Chinese oil companies

The rise of China as an export destination of African oil in recent years has led to a much greater involvement of the Chinese IOCs and suppliers in the region. In Q1-Q3 of 2013 in Mozambique alone, Chinese and Indian NOCs had invested a combined USD 9.3 billion on their involvement in that country's recent LNG boom.¹

The major Chinese players in the sub-Saharan African oil and gas sector are the China National Petroleum Corporation (CNPC), China National Offshore Oil Corporation (CNOOC) and Sinopec, backed by a wide array of affiliated groups such as China National Oil and Gas Exploration and Development Corp (CNOOC), PetroChina, BGP International, and the China Petroleum Engineering & Construction Group (CPECC).² The following Sections detail recent investment activity by these Chinese companies in the region, as well as specific oil blocks and infrastructure projects with which they are involved.

10.1.1 Investment activity

CNPC is the world's fourth largest oil company. In their Annual Report 2012, they state that seeking a greater international role is one of their key aims. Similarly, CNOOC's capital expenditure plan for 2013 indicated that over one-third of their expenditure (36 per cent) will be made overseas.³ Sinopec plans to invest USD 20 billion in Africa over the next 5 years.⁴

Table 10.1 summarises the significant developments and recent investments made by these companies in the Africa oil and gas sector.

1 "China takes the lead in oil M&A activity," Financial Times, 8 September 2013. <<http://www.ft.com/cms/s/0/2428238a-13cc-11e3-9289-00144feabdc0.html#axzz2pLcU2GPs>>.

2 "China in Africa," Institute of Developing Economies Japan External Trade Organization. <http://www.ide.go.jp/English/Data/Africa_file/Manualreport/cia_07.html>.

3 "2013 Strategy Review," CNOOC Ltd, 30 January 2013. <<http://www.cnoocltd.com/encnoocltd/tzzgx/yjhtjcl/Presentations/images/20131301051.pdf>>.

4 "Sinopec in Africa: A Local Corporate Citizen," Sinopec, 30 June 2013. <<http://www.sinoppecgroup.com/gsjs/Documents/SinopecinAfricaEN.pdf>>.

Table 10.1: Chinese investments in the sub-Saharan oil and gas sector

2004
In Angola, Sinopec beat ONGC-Vindesh to acquire Shell Oil's 50 per cent stake in Block 18, operated by BP-Amoco. One of the reasons for the success of the bid was that Sinopec showed intent to buy a share in the Lobito oil refinery.
In March 2004, the delivery of 10 Mbbl/d of crude oil was tied to a USD 2 billion Chinese loan to Angola to be repaid over 17 years at 1.5 per cent interest.
In late 2004, via the intervention of Portuguese/Angolan Escom International, a joint venture was established between the Chinese Hong Kong based group Beiya International Development Company and Sonangol in the form of China-Sonangol International Holdings (CSIH) based in Hong-Kong. Part of its work was to assist in training Sonangol oil technicians in return for paving China's entry into Sao Tome Principe's potentially lucrative oil market.
September 2005
CNPC's subsidiary PetroChina signed a USD 800 million agreement with the Nigerian National Petroleum Corporation (NNPC) to import 30 Mbbl/d for five years.
January 2006
CNOOC announced a USD 2.3 billion purchase of a 45 per cent stake in Nigeria's OML 130 deepwater oilfield. This was CNOOC's first venture into Africa and the single largest Chinese investment made in Africa at the time. A few months later, Sinopec won a deal for oil rich offshore deepwater prospecting blocks in Angola, worth USD 2.4 billion.
January 2006
CNOOC purchased 45 per cent of Block ML130 in the Niger Delta, with reserve estimates of 600 MMbbl covering approximately 500 square miles of Akpo Oilfield and other discoveries. The total deal offered by CNOCC was worth USD 2.7 billion. Today these fields produce 175,000 bbl/d for CNOOC.
February 2006
Angola became China's main oil supplier, surpassing Saudi Arabia to cover 13 per cent of its total imports. In March 2006, China and Angola announced the establishment of a joint venture between Sonangref and Sinopec to build a USD 3.4 billion oil refinery in Lobito with a capacity of upwards to 240,000 bbl/d.
June 2006
Sinopec acquired large stakes in offshore Blocks 15, 17 and 18 at a total cost of USD 2.2 billion. The three blocks have total proven reserves of 3.2 billion barrels of oil and boosted oil production for Sinopec by 100,000 bbl/d after they came on-stream in 2007. SSI acquired stakes of 27.5 per cent, 40 per cent and 20 per cent in the offshore blocks respectively. Sinopec holds a 55 per cent stake in the SSI joint venture. This acquisition is linked to the supply of oil to the planned Lobito refinery.

July 2006
CNPC won two blocks located in the north-eastern Lake Chad Basin and two in the Niger Delta. The rights in the Lake Chad basin blocks were sold for USD 510,000 each, while the two in the Niger Delta were sold for USD 5 million and USD 10 million respectively.
Early 2009
It was announced that CNOOC, CNPC and Sinopec were competing to be chosen to lead a bid for an oilfield in Ghana. An offshore field in Ghana, the principal asset of US-based Kosmos Energy, could be sold for more than USD 3 billion and is expected to attract bids from oil companies around the world. The field is believed to hold oil in excess of 1.2 billion barrels of proven reserves.
June 2009
CNPC reportedly signed another USD 5 billion contract with Niger's Government to develop the large Agadem field estimated to hold more than 300 MMbbl of oil. This excludes suggested plans to build a 2,500km pipeline at an additional cost of USD 5 to 7 billion to pipe the oil to southern Benin.
June 2009
Sinopec's bid to purchase Swiss-based Addax Petroleum for USD 7.2 billion. Control of Addax Petroleum will give Sinopec a foothold in West Africa and lay the foundation for a major expansion in the region. Addax has a daily estimated production of over 136 Mbbl/d and presently controls oil fields in Nigeria, Gabon, Cameroon and northern Iraq. Sinopec's ownership of Addax will allow China to expand without the necessity of bidding rounds and negotiations with the various oil and gas regimes in the continent.
July 2009
Sinopec was the first to start a drilling programme in the Nigeria-Sao Tome and Principe Joint Development Zone (JDZ) from the companies awarded blocks in the JDZ's last bidding round. The delay in exploration was caused by a shortage of deepwater rigs. Sinopec spudded its first well on Block 2 using Transocean's SEDCO-702 deepwater rig in 2009.
March 2013
CNPC announced that it acquired a 28.57 per cent stake in ENI East Africa, owner of a 70 per cent interest in an offshore gas block in Mozambique. With an investment of USD 4.21 billion, CNPC indirectly acquired a 20 per cent stake in Area 4 in Rovuma natural gas basin. The deal was CNPC's largest overseas purchase, according to Bloomberg. It marks the entry of a Chinese major in the highly prospective natural gas region.
June 2013

Sinopec paid USD 1.52 billion to Marathon Oil Corp for 10 per cent in Block 31, estimated to hold 500 MMbbl of oil reserves. Sinopec increased its overall share in the field to 15 per cent due to an earlier acquisition from Total.

September 2013

CNOOC secured a USD 2 billion oil block deal in Uganda in efforts to increase production. The deal will result in CNOOC producing oil from The Kingfisher field (Block 3A) within four years. According to the BBC, Ugandan Minister of State for Mineral Development, Peter Lokeris, disclosed the field will have an initial capacity of 30 to 40 Mbbl/d. The Kingfisher field holds approximately 196 MMbbl of commercially viable, recoverable oil out of its estimated 635 MMbbl of oil reserves.

Source: see footnotes.⁵

The following Sections provide further detail on the projects and oil blocks major Chinese oil companies are currently involved in.

10.1.2 Sinopec and China Sonangol⁶

Sinopec currently operates in 15 countries on the continent, with assets totalling USD 22 billion. Over the next 5 years, they intend to invest a further USD 20 billion in Africa, signalling a significant increase in interest in the region. One of their more significant operations is in Angola.

Angola

Sinopec (China's second largest oil and gas producer) has a joint venture with Sonangol Sinopec International, which holds 50 per cent participating interest in Block 18 in Angola. Block 18, operated by BP, covers an area of more than 5,000 km² and lies in water depths of 500 – 1,600 m. It contains the Greater Plutonio development, consisting of five fields discovered between 1999 and 2001.

Apart from Block 18, China Sonangol, together with many of the large companies involved in the oil and gas sector (including British Petroleum, Total, ExxonMobil, Petrobras, Sonangol E.P), has interests in eight other oil blocks in Angola.

- Angola Offshore Block 3/05 - Offshore development comprised of seven oil fields with 14 platforms, one terminal and mooring pile
- Angola Offshore Block 3/05A - Offshore exploration with first oil revenue from Caco & Gazela and Punja areas expected in 2014 and 2015 respectively
- Angola Offshore Block 15/06 - Deepwater exploration with first oil revenue from

5 "China in Africa: a strategic overview," Executive Research Associates Ltd., October 2009. <http://www.ide.go.jp/English/Data/Africa_file/Manualreport/pdf/china_all.pdf>; "Nigeria awards oil exploration licenses to China," Inquirer, 20 May 2006. <<http://www.inquirer.net/specialreports/oilprices/view.php?db=1&article=20060520-2292>>; "CNPC Invests US\$4.2bn to Access Mozambique Gas," Silk Road Finance. <<http://www.silkroadfin.com/news/cnpc-invests-us42bn-access-mozambique-gas>>; "Sinopec buys Marathon interest in deepwater Angola block," Offshore, 24 June 2013. <<http://www.offshore-mag.com/articles/2013/06/sinopec-buys-marathon-interest-in-deepwater-angola-block.html>>; "Chinese Oil Firm Secures \$2 Billion Ugandan Oil Deal," Ventures, 26 September 2013. <<http://www.ventures-africa.com/2013/09/chinese-oil-firm-secures-2b-ugandan-oil-deal/>>.

6 China Sonangol, Our Business, 2012. <http://www.chinasonangol.com/oil_and_gas.html>.

Western hub expected in 2013

- Angola Offshore Block 17/06 - Deepwater exploration with 4 exploration wells declared viable for commercial recovery
- Angola Offshore Block 18/06 - Deepwater exploration with discovery of high quality oil
- Angola Offshore Block 18 - Discovered between 1999 and 2001, this is the first BP operated asset in Angola. It has total estimated reserves of approximately 750 MMbbl
- Angola Offshore Block 31 - Ultra-deepwater located in the Lower Congo Basin in Angola
- Angola Offshore Block 32 - Ultra-deepwater with first oil revenue expected in 2016
- Angola Onshore Cabinda North Block - Onshore exploration with first oil revenue expected in 2015.

Through one of its affiliate companies, China Sonangol is also reviewing an oil refinery project to be located on the coastline, south-west of the Soyo province in Angola. The intention is to process crude oil into a range of refined products compliant with the Euro IV emission standard at the refinery.⁷

In June 2013, Sinopec agreed to the purchase of Marathon Oil Corporation's 10 per cent stake in Block 31 in Angola, a field with estimated proven and probable reserves of 533 MMbbl.⁸ This deal is subject to approval by both the Angolan and Chinese Governments.

10.1.3 China National Petroleum Corporation (CNPC)

Chad⁹

In December 2003, CNPC signed an agreement with the Swiss company Cliveden to buy shares for the risk exploration of Block H in Chad. Block H covers the whole or partial area of seven depositional basins - Chad Lake, Madiago, Bongor, Doba, Doseo, Salamat and Erdis.

In 2006, CNPC obtained all the equity of Block H, and made oil discoveries, including Baobab and Ronier-1 in the Bongor Basin of the block. Well Ronier-1 encountered three sets of oil and gas formations of different grades, producing conventional crude oil for the first time in Chad.

On 20 September 2007, CNPC and the Chadian Ministry of Petroleum signed an agreement for the establishment of a joint venture refinery including a pipeline from Ronier to the refinery. The refinery is 60 per cent owned by CNPC and 40 per cent owned by the Chadian Ministry of Petroleum. N'Djamena JV Refinery was the second refinery that CNPC had designed and built overseas. Its associated power station supplies electricity to the capital of Chad. In 2011, the project became operational. On July 10, 2011, its first petroleum products were delivered to the local market.

⁷ "Our Business," China Sonangol, 2012. <http://www.chinasonangol.com/oil_and_gas.html>.

⁸ Wong, F., "China's Sinopec buys Marathon's Angola oil fields for \$1.52 billion," Reuters, 23 June 2013. <<http://www.reuters.com/article/2013/06/23/us-china-cnpc-idUSBRE95M07W20130623>>.

⁹ "CNPC in Chad," CNPC, 2011. <<http://classic.cnpc.com.cn/en/cnpcworldwide/chad/>>.

In 2009, exploration in Ronier and Mimosa areas in the Bongor Basin resulted in the discovery of new reserves. Significant progress was also made in the exploration of Prosopis and Baobab.

In 2010, CNPC made key exploration discoveries in Bongor Basin, and achieved successful formation tests in the risk exploration well Cassia N-1 deployed in the Naramay area of Block H, which yielded a 1,000 tons per day of oil flow.

In 2011, a group of oil fields was discovered at Block H in Chad's Bongor Basin.

In 2012, CNPC discovered the oil-rich Lanea Block in the Bongor Basin and made important progress in reservoir exploration in Raphia region.

However, in 2013, relations took a turn for the worse as Chad suspended CNPC's operations in the country because of an oil spill. They were allowed to continue operations in October 2013 but received a USD 1.2 billion fine for environmental violations in March 2014.¹⁰

Niger¹¹

In June 2008, CNPC was awarded a license to produce oil from the Agadem Block in the eastern Diffa region bordering Chad. The agreement with the Government stipulated that USD 5 billion would be invested in drilling 18 exploration wells, building a refinery with a capacity of 20 Mbbl/d and constructing a 2,000 km pipeline. IHS reported that in October 2007, CNPC was one of eight companies that submitted bids for the Agadem Block concession - which IHS described as "Niger's most attractive asset". Other bidders were Petronas, Sonatrach, Burren Energy, South Africa Energetic, ATI Petroleum, Tullow Oil and TransAfrican Energy.

In October 2008 foundations were laid for the Soraz refinery. This JV refinery between CNPC and Niger Government is located at the southern city of Zinder, with a designed crude processing capacity of 1 Mtpa. Construction of the pipeline also went ahead and became operational in October 2011. In November 2011, the Zinder Refinery then became operational, completing Phase-I of the Agadem upstream and downstream integrated project.

The Agadem Oilfield began producing in November 2011, with production reaching an estimated capacity of 20 Mbbl/d in 2012. The Agadem Block supplies the Soraz Oil Refinery with an annual yield of 44,200 tonnes of LPG.

Nigeria¹²

In 2006, CNPC reached an oil and gas cooperation agreement with the Government of Nigeria and won the tender of four blocks, namely OPL 298, OPL 471, OPL 721 and OPL 732. Block OPL 298 (onshore) and Block OPL 471 (offshore) are located in the Niger Delta. Block OPL721 and Block OPL732 are located in the Chad Basin in Borno Province, northern Nigeria. Block OPL732 is a risk exploration block.

10 Nako, Madjiasra, "Chad fines China's CNPC unit \$1.2 billion for environmental damage," Yahoo news, 21 March 2014. <<http://news.yahoo.com/chad-fines-cnpc-unit-1-2-billion-environmental-175617905--finance.html>>.

11 "CNPC Operations in Niger," Open Oil, 17 April 2012. <http://wiki.openoil.net/index.php?title=CNPC_Operations_in_Niger>.

12 "CNPC in Nigeria," CNPC, 2011. <<http://classic.cnpc.com.cn/en/cnpcworldwide/nigeria/>>.

10.1.4 China National Oil and Gas Exploration and Development Corporation (CNOOC) petrochemical trading company

CNPC's solely-owned trading company CNOOC was established in May 2000. Possessing six service stations and one product oil depot, the company's annual sales of gasoline and diesel oil reached 100,000 tonnes.

Since 2001, the CNOOC Petrochemical Trading Company has built six refuelling stations and one fuel depot, marketing approximately 100,000 tons of gasoline and diesel annually. Khartoum Petrochemical Company's Polypropylene Plant became operational in January 2002, and expanded its annual capacity to 20,000 MMtpa in 2008. In April 2004, KPC's Plastic Processing Plant was put into production, with an annual production capacity of 20 million standard-sized woven sacks.

10.1.5 China National Offshore Oil Company (CNOOC)

CNOOC is working with Total in Nigeria's Akpo and Egina deepwater fields to gain knowledge in preparation for exploring domestic deepwater reserves. The block which contains the Akpo field, operated by Total, started production in 2009. CNOOC claimed it contributed more than USD 2 billion to develop the field. The Akpo field is capable of pumping 225 Mbbl/d of oil equivalent, or 9 per cent of Nigeria's current production, according to Total. During peak production, CNOOC's light oil entitlement from the block was nearly 79 Mbbl/d.¹³

10.2 Appendix II – Featured interviews

10.2.1 Interview with a Management Consultant with experience in the Angolan oil and gas industry

Mr. Richard Oshowole is a management consultant with over 25 years of experience. He has worked with both private and public sector clients in Europe, Africa and Asia and held senior consultancy positions with British and International firms. He has extensive experience within the oil and gas industry, notably in Angola.

1. What type of infrastructure challenges most effect oil and gas operations in Africa?

There are many infrastructural issues across Africa ranging from poor port access to difficulties in laying pipelines. Basic infrastructure issues are challenging. What I have noticed, however, is that oil and gas companies are able to solve these problems themselves. For example, Chevron's operations in the Cabinda province of Angola generate their own power; they provide their own food for a national and international workforce of 5000 people. The complex is like a self-contained enclave. Most oil companies are very good at solving the infrastructure problem themselves. They can build their own airports and develop airlines to service these production bases. There are obviously considerable challenges but companies seem able to resolve these issues.

2. A lack of skilled workers is often cited as a challenge. Specifically what types of staff are in shortage? How do companies deal with this?

¹³ "Chinese Oil Corporation taps into Nigerian resources," NNPC, 2010. <www.nnpcgroup.com/PublicRelations/NNPCinthenews/tabid/92/articleType/ArticleView/articleId/209/Chinese-Oil-Corporation-taps-into-Nigerian-resources.aspx>.

An offshore rig can cost millions of dollars and you want skilled experienced people to run these rigs. No one wants to take a risk by employing people who don't have the required experience from basic positions such as welders to the person in charge of running the drilling operations. Rigs and other oil and gas infrastructure are very expensive assets and you want to employ the right people with the right experience. There are skills shortages in Angola and sub-Saharan Africa as is the case globally in this sector. If you need someone to head a rig the industry standard is that you need 20 years experience and there may be very few Angolans who have that. The oil sector is very international; employees come from all over the world as long as they have the required skills and experience. In operations production there are skills shortages but this is a global problem. There is a considerable demand for skills but there is a global skills shortage especially on the operational side of the oil and gas sector.

3. Some countries, such as Angola, have local content policies in relation to employment. How do you think local content policies affect Western oil and gas companies doing business in Africa?

Yes, it does add an extra pressure. For example, if you look at the development of the North Sea oil sector in Scotland in the 1960s and 1970s, there wasn't such a vibrant production sector. It really took off in the late 1970s as Scottish universities began offering petroleum engineering courses and training; the economy was able to adjust itself to the North Sea industry. In many African countries there is a lack of skills and a lack of economic capacity to adjust to the oil and gas sector. It is a challenge to have an industry that doesn't generate local opportunities and employment. For example, the main production site in Angola, Malongo, is a camp with a barbed wire fence and mines. Five thousand people live there and food is flown in. There is nothing outside of that area, just jungle. This is one of Chevron's top sites globally. It is important for companies to have a local impact. Local content policies are good and it can contribute to limiting tension. The Niger Delta region has produced since the 1950s but there have been no real meaningful jobs for people within much of the industry there besides labourers etc. Local content is very important. Local content isn't really an issue for oil companies in the short term but in the long term it is much cheaper for them to have the skills available locally. Not having to pay expatriate and relocation packages would reduce the costs. In the Cabinda province in Angola, most of the flights from South Africa, Holland, Britain and America are full of oil workers coming in to work a 28 day rotation. Once you can get the skills locally you can save on extra costs involved such as expatriate housing and schools. In the long term local content makes sense. Oil companies have whole departments dedicated to Corporate Social Responsibility that build schools, develop water and power sharing schemes. From a business point of view oil and gas companies do not have a problem with social responsibility and local content because it is in their interests to have skilled people available locally. You pay a drilling engineer USD 100 000 and you have to cover the costs of relocation whereas if you do it locally you pay the engineer the same amount but without the extra costs. There are transitional issues in many countries in Africa. Angola only just emerged from many years of conflict and simply does not have the human capital. On the other hand, Nigeria has had a fairly aggressive indigenous approach in terms of policy and they now often export human capital to other countries in Africa.

4. What type of local companies exist that you would want to retain? Are there any types of companies that you would want to use but that do not operate/exist?

In most places it seems like there are all the support companies you could want. Companies involved in the oil and gas sector tend to follow each other around. Halliburton, for example, is pretty much everywhere. It tends to be the same firms supplying goods and

services. In Angola, there is a policy that means you can't do business in Angola unless you are an Angolan company. This has often led to companies such as Halliburton or Panalpina incorporating local companies. I have recently worked on an interesting project with Chevron. The company wanted to outsource several areas of operation covering about 40-45 per cent of the operation to Angolan companies. Chevron decided not to simply incorporate a local company but to try and support and grow Angolan companies. Chevron would identify local companies that we wanted to grow and then would help to build the company through development plans. Companies are increasingly trying to get local suppliers that may be at a low level and then try and bring them into the game. Good local companies are important and oil companies realise that they need to help grow locally based companies through technical partnerships rather than just incorporating local companies.

5. To what extent are local companies involved in upstream and midstream processes within the oil and gas industry?

It depends on the market and country in question. Angola tends to be less developed than say, Nigeria. Nigerian companies have started trying to acquire oil blocks and participate more fully in the oil and gas sector. Local companies in partnership with foreign companies often play roles throughout the sector through technical partnerships.

6. How many Western suppliers of goods and services are there in Angola?

Most suppliers of goods and services are Western or local variants.

7. What are some of the operational constraints for Western companies that provide goods and services?

Legislation can be an operational constraint. In the past suppliers could land goods directly in the Cabinda province in Angola but a new piece of legislation came into place that meant goods could no longer be flown in, they had to be shipped via Luanda as the Government wanted to develop the shipping industry. This caused some logistical problems as companies had to find partners that could handle shipping goods without delays. Companies also began keeping more stocks on site to balance this. There are legislative issues and changes that you have to respond to. Oil companies are pretty good at working in any kind of environment and are adaptable. Operational constraints range from the logistics involved in just having people there, staff you need to feed, safety and security issues, recreation whilst maintaining world class standards. Going back to local content and staffing, if you had local suppliers and capacity this would greatly reduce some of these operational constraints.

8. What types of services and goods are hard to procure?

Companies generally manage to procure all the goods and services necessary. Oil and gas is a multibillion dollar industry and companies are able to get what they need. In Angola, oil and gas companies have got involved with projects to build their own tugs to take people out to rigs. Companies can buy things relatively easily but it's trying to get it done in Angola or on the continent with a good local partner and a good technical foreign partner that is increasing being prioritised and which can be challenging.

9. What would you say are the three most important factors for foreign companies operating in sub-Saharan Africa to be successful?

Choosing the right local partner is crucial. It is important to be realistic about the relationship with your local counterpart, at the end of the day you don't have the political

power or know how in that environment. Companies need to recognise that the way the oil industry does business is changing globally and companies need to adapt to that rather than dig their head in the sand. Companies need to live up to their positive responsibilities by creating local employment and showing the benefits of the industry to the local community. When you fly into Luanda and you see all these planes arriving and oil workers from all over the world arriving, you just wonder who is actually benefiting from this.

10. What is your experience of dealing with national oil companies?

It can be difficult. Companies can come under pressure and it is difficult to do what might be expected in certain environments whilst maintaining legal responsibilities. For many countries in Africa, politics tends to blur into business. This is a considerable challenge in dealing with national oil companies. In addition, the effectiveness and efficiency of many national oil companies leaves a lot to be desired.

11. How do you deal with local governance and central governance? Is there a difference for companies operating within the oil and gas sector?

This differs depending on the country in question. In Nigeria, oil is federally owned and revenue is shared by federal governments which can be a source of tension. In Angola, Cabinda has wanted to break away from Angola for some time and oil companies have to manage local government relationships and central government very carefully. Cabinda is very resource rich but also terribly underdeveloped. It is important for oil companies to be sensitive to political economy issues surrounding local and central governance. It is also crucial to understand the political history and deal with local and central governments in a progressive way with some sort of vision.

12. How do companies negotiate with governments in relation to domestic industry vs export?

This is not really problematic. Many countries in Africa have considerable gas resources for example Nigeria. If the price for gas locally is the same as it would be on the global market but without the need to liquefy and export it, oil companies wouldn't care. Local domestic gas obligations aren't generally problematic as long as companies can make the same profit. Often where there is a difference in price between domestic use and export there are subsidies available. It can be problematic on occasion. In Nigeria the Government introduced a domestic gas obligation but the price was too low.

13. What would your top three recommendations for doing business within the African oil and gas sector be?

Get a deep knowledge of the market; don't go into the sector without doing in-depth research and analysis. Make sure that you choose the right partners and the right suppliers and ensure that you have a realistic vision for what you are doing that's positive for your business and the country where you are doing your business. If you are new to the market it is critical that you have a very good understanding of the context and that you work with the right people.

10.2.2 Interview with an engineering sub-contractor working in Equatorial Guinea

An interview was conducted with an engineering sub-contractor involved in well resources inspection, repair and maintenance services to the oil, gas and petrochemical industry in Equatorial Guinea. He offered the following insights about his experience:

- Buying the necessary facilities and registering them was not problematic in Equatorial Guinea. There are considerable challenges with basic infrastructure but it is nowhere near as bad as it used to be. Recent years have seen considerable development.
- Getting skilled workers can be challenging but the situation is improving. Many oil and gas companies are waking up to the idea that in order to fully utilize their investments, they have to invest and finance the training of certain people who can then become oil and gas professionals. But there are significant shortages of trades people and mechanics.
- The Equatoguinean context can be challenging because there is an added pressure of ethnic and family networks. Many of the main players within the government ministries are related and there is a high level of nepotism.
- Local content negatively affects IOCs or other players in the oil and gas sector when the companies do not participate in the local content programme. Unless companies invest in people and local content then employing skilled workers will remain a challenge. Oil and gas companies have to be the driving force behind this. IOCs are generally making 20-30 year commitments within these countries and local content is therefore crucial.
- In Equatorial Guinea there are a limited number of local companies involved in the sector. International companies must choose their local partners carefully to ensure they have good business ethics. In the case of Equatorial Guinea getting traceability certificates can be difficult, you have to make a judgment about whether or not you can use local supplies and goods companies.
- Many local suppliers require that you pay the entire amount owed before you get the goods. Each company will have to judge whether the terms and conditions are reasonable and feasible for each transaction. A high degree of caution and careful judgment is needed when relying on local companies in the Equatoguinean context.
- Companies need an enormous amount of resilience and flexibility in order to operate in most countries in Africa. Backup plans or extensive contingency plans are crucial. In some countries companies may even require staff evacuation plans. An understanding that last minute planning and a level of fluidity in planning is also vital. The business environment changes rapidly and medium to long term plans can be made but are likely to change throughout business operations.
- Companies must have an appetite for risk and should invest as much as they can afford to lose.
- Doing business in Africa can be incredibly lucrative and rewards are very high. Companies must consider the profits and risks carefully.
- In certain contexts, sub-contractors may have a limited shelf life. In Equatorial Guinea many sub-contractors are only in operation for 6 years and there is a high risk of being muscled out by people who are well connected to the Government.

10.2.3 Interviews with other oil and gas company employees and contractors working in sub-Saharan Africa

A number of other interviews were conducted with various employees and contractors associated with the oil and gas industry in sub-Saharan Africa. The following is a summary of their main points.

- Other interviewees identified broad challenges for western oil and gas companies including high levels of corruption, lack of transparency and environmental issues such as oil spills, pipeline infrastructure and dumping.
- Respondents generally viewed local content positively, as it ensures foreign companies will improve and increase their economic benefit to the population and country in question.
- One interviewee indicated that local companies tended not to be involved in upstream and midstream processes due to corruption and strong competition with well-established western companies. The interviewee also suggested that a lack of local technical knowledge and expertise as well as a lack of budget to finance larger oil and gas projects during the tendering and bidding process were further limitations to local participation.
- Joint ventures and technical partnerships were frequently identified as effective ways of ensuring that local companies become more involved in the oil and gas sector.
- Other challenges of operating within production sharing agreements or other similar arrangements with national oil companies were identified. Such arrangements can be problematic for African governments. Often African governments do not have the finance or expertise to drill which can result in oil companies making considerable demands and can force the government to accept a lower percentage stake, although this is less problematic in countries with well-established oil and gas sectors such as Angola and Nigeria. Local content clauses within production sharing agreements are also often ignored by IOCs and only low skilled manual labour may be offered to the locals in certain countries.
- Interviewees identified onshore/offshore opportunities for drilling of natural gas as a key opportunity for IOCs and international suppliers.
- Joint ventures with local companies, transparency, compliance and training and hiring local staff in leading positions were suggested as top recommendations for doing business within the African oil and gas sector.

10.3 Appendix III – Conclusion matrix methodology

Table 10.2, Table 10.3, Table 10.4 and Table 10.5 display the opportunity and risk rankings and how totals were calculated for each country of study in this report. Each ranking was applied based on the content and associated research for the report, as well as referenced sources.

Table 10.2: IOCs opportunity index¹⁴

Opportunities rankings	Proven reserves (billion bbl and tcf)	Potential reserves	Developments	Exploration activity	Total
Nigeria	67.53 = 10	108 = 5	5	2	22
Angola	12.63 = 7	16.33 = 3	4	5	19.5
Equatorial Guinea	1.32 = 5	2.43 = 1	3	3	12
Ghana	0.79 = 4	5.75 = 2	2	2	10
Mozambique	0.75 = 4	29 = 4	4	5	17
Tanzania	0.04 = 2	7 = 2	3	4	11

Table 10.3: IOCs risk index¹⁵

Risks rankings	Political stability and security	Corruption	Business environment	Legislation	Total
Nigeria	CC and H = 5	144 = 3	147 = 3	5	16
Angola	B and H = 4	153 = 4	179 = 5	4	17
Equatorial Guinea	CC and L = 3	163 = 5	166 = 4	4	16
Ghana	BB and L/M = 2	63 = 1	67 = 0	3	6
Mozambique	B and M/H = 3	119 = 2	139 = 2	2	9
Tanzania	B and M/H = 3	111 = 2	145 = 3	4	12

Note: Political stability rankings range from A – CC and Travel Security rankings range from Low – High. Doing business rankings are out of 189 countries.

14 U.S. Energy Information Administration, International Energy Statistics, 2013. <<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>>.

15 Transparency International, “Corruption Perception Index 2013,” December 2013. <<http://www.transparency.org>>. Corruption perception rankings are out of 177 countries; Doing Business, “Doing Business 2014,” 29 October 2013. <<http://www.doingbusiness.org/~media/GIAWB/Doing%20Business/Documents/Annual-reports/English/DB14-Full-Report.pdf>>; The Economist Intelligence Unit. <<http://www.eiu.com>>; Harvard Travel Assist. <<https://www.internationalsos.com/MasterPortal/default.aspx>>.

Table 10.4: International suppliers opportunity index¹⁶

Opportunities rankings	Oil and gas opportunity	Infrastructure and electrification	Population (millions)	Total
Nigeria	11.5	129 & 48 per cent = 4	174 = 5	103.5
Angola	10.25	148 & 37.8 per cent = 5	19 = 2	71.75
Equatorial Guinea	7.5	2	0.7 = 1	22.5
Ghana	5	90 & 72 per cent = 1	26 = 3	20
Mozambique	8.5	126 & 20.2 per cent = 5	24 = 3	68
Tanzania	5.5	124 & 15 per cent = 5	48 = 4	49.5

Note: Total = oil and gas opportunity * (Infrastructure and electrification + Population)

Table 10.5: International suppliers risk index

Risk rankings	Political risk	Security	Corruption	Total
Nigeria	CC = 5	H = 5	144 =3	13
Angola	B = 2	H = 5	153 = 4	11
Equatorial Guinea	CC = 5	L = 1	163 =5	11
Ghana	BB = 3	L/M = 2	63 = 1	6
Mozambique	B = 2	M/H = 4	119 = 2	8
Tanzania	B = 2	M/H = 4	111 = 2	8

Note: Political stability rankings range from A – CC and Travel Security rankings range from Low – High.

16 The World Bank, Access to Electricity, 2011. <<http://data.worldbank.org/indicator/EG.ELC.ACCE.ZS>>; World Economic Forum, “Global Competitiveness Report 2013 – 2014,” 3 September 2013. <http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf>.

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Execution (investment and operation)	<ul style="list-style-type: none">- Project management consulting (from project initiation to execution)- Local capacity development- Supply chain management- Business process reengineering	<ul style="list-style-type: none">- Proposal development- Provision of in-house consultants- Negotiation and trouble shooting- Local representation- Logistic support

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