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COUNTRY ANALYSIS BRIEFS

# West Africa (ECOWAS)

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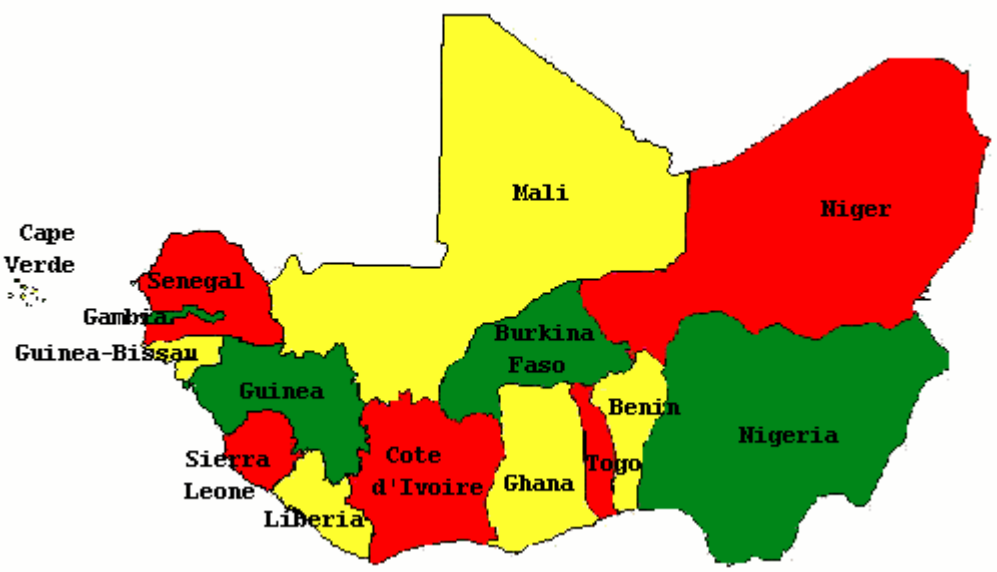
## Background

***The Economic Community of West African States (ECOWAS) was formed to promote economic and development growth in West Africa. Major exports from the region include energy products, minerals and agricultural products.***

Regional leaders created the Economic Community of West African States (ECOWAS) on May 28, 1975 in Lagos, Nigeria. ECOWAS is comprised of 15 countries, which include: Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo. The leaders established ECOWAS to promote regional integration and economic growth in West Africa, as well as to create a monetary union in the region. However, ECOWAS has encountered problems in the process of regional integration including: political instability and lack of good governance that has plagued many member countries, the insufficient diversification of national economies, the absence of reliable infrastructure, and the multiplicity of organizations for regional integration with the same objectives.




The Authority of Heads of State and Government is the governing body of ECOWAS. The Authority determines the general direction and development of the Community, as well as the realization of the Community's objectives. The Authority elects an annual Chairman, with the 2006 Chairman being Niger's President, Mamadou Tandja. Under the Authority is the Council of Ministers, which is responsible for the proper functioning of the Community. In April 2002, the Council approved a procedure for the ECOWAS Trade Liberalization Scheme (TLS). The TLS entitles the manufacturers of approved products to customs duty exemption within ECOWAS member states. The procedure uses National Approval Committees, set up by member states, to handle the approval of products to be granted exemption under TLS. The 2002 decision by the Council abrogates a previous decision and grants the Council a monopoly for approving applications for such exemptions.

In 1990, ECOWAS established the Economic Community Monitoring Group (ECOMOG), a multilateral military peacekeeping force to intervene in the civil war of Liberia. Since 1990, ECOMOG has been deployed in civil conflicts in Sierra Leone, Guinea-Bissau and Côte d'Ivoire. The Côte d'Ivoire disarmament and peace mission included ECOMOG troops from Benin, Ghana, Niger, Nigeria, Senegal and Togo. Overall, Nigeria has contributed the largest amount of troops, materials and financial support to ECOMOG missions. ECOWAS is seeking international support to enable it to train and equip the 15 battalions of troops pledged by member states. The training of the composite units facilitates their effectiveness in peacekeeping, humanitarian assistance and other missions for which they could be deployed.

### Economic Overview

In 2005, the combined Gross Domestic Product (GDP) for ECOWAS was estimated at $139 billion (see Table 1.). Economies within the Community are at varying stages of development. Nigeria's economy is larger than the combined GDP of all other ECOWAS countries, with a GDP of $78 billion. In 2005, the Community's economies grew at a combined weighted average rate of 5.0 percent. However, substantial external debt within individual states remains one of ECOWAS' greatest challenges. In addition, internal strife has adversely affected economic performance in several states.

Total regional exports, including intra-regional exports, were $68.4 billion in 2005 and ECOWAS had a $17.5 billion trade surplus. The region's major export commodities were energy products (crude oil and refined petroleum products), minerals (gold, diamonds, and bauxite) and agricultural products (cocoa, coffee, groundnuts, and cotton). The primary U.S. import from the region was Nigerian crude oil. As of January 1, 2006, President Bush approved the designation of 37 sub-Saharan African countries as eligible for tariff preferences under the African Growth and Opportunity Act (AGOA). As required by the legislation, this annual determination signifies which countries are making continued progress toward a market-based economy, the rule of law, free trade, economic policies that will reduce poverty, and protection of worker's rights. Côte d'Ivoire, Liberia, and Togo were the only countries in the region not approved for the AGOA.

In 1994, ECOWAS' Francophone members Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal and Togo, with Lusophone Guinea Bissau, created the West African Monetary Union (UEMOA) in Senegal. UEMOA is a regional economic and monetary union which shares a common currency (the CFA Franc). Five ECOWAS Anglophone-members, The Gambia, Ghana, Guinea, Nigeria and Sierra Leone, have proposed setting up a second West African Monetary Zone (WAMZ) in December 2009 and launching a new common currency, the Eco. All five states signed the 2000 Accra Declaration for the creation of the second monetary zone, agreeing to reform their economies to meet specific targets prior to the introduction of the Eco. It is planned that the Eco would circulate simultaneously with the CFA Franc, with the ultimate goal of creating a single monetary zone for the entire Community. Both Liberia and Cape Verde have shown interest in becoming members of the WAMZ.

### Energy Overview

Commercial energy resources in ECOWAS, primarily petroleum and natural gas, are concentrated in coastal and offshore regions. Electricity in West Africa is generated through thermal (57.8 percent of installed capacity) or hydroelectric (42.2 percent) resources. Natural gas could take a more significant role in the Community's energy sector as fields in Nigeria and Côte d'Ivoire are developed. Due to a relatively small urban population in ECOWAS (approximately 33.9 percent) and lack of infrastructure, access to commercial energy sources is limited. In 2005, Nigeria had petroleum exports of 2.3 million barrels per day (bbl/d), while Côte d'Ivoire, exported 39,000 bbl/d of petroleum. All other ECOWAS countries are net energy importers.

In 2003, ECOWAS consumed (see Table 2.) 1.43 quadrillion British thermal units (Btu) of commercial energy (0.4 percent of total world consumption) and produced 5.82 quadrillion Btu (1.4 percent of total world production). Also in 2003, the region generated 33.2 million metric tons of carbon equivalent (0.5 percent of the world total). Nigeria accounted for 66.7 percent (0.99 quadrillion Btu) of energy consumption in ECOWAS, 96.3 percent (5.6 quadrillion Btu) of energy production, and 76.9 percent (33.16 million metric tons) of the Community's carbon emissions.

ECOWAS has plans to create a $50 billion fund that will be used to boost energy services for the West African population and to curb energy shortfalls that are seen as a hindrance to economic development and regional integration. ECOWAS has set December 2007 as the target for the creation of the fund. By 2015, with the help of additional energy, ECOWAS would like to see a 50 percent reduction in poverty within the Community.

## Oil

***Nigeria is West Africa's only significant oil producer.***

Nigeria, West Africa's only significant oil producer, had oil production averaging 2.6 million barrels per day (bbl/d) in 2005 (see Table 3). According to the *Oil and Gas Journal* (OGJ), Nigeria's estimated proven crude reserves are 35.9 billion barrels, and this constitutes 96 percent of the Community's estimated proven crude reserves. Smaller reserve deposits are located in the Gulf of Guinea (offshore Benin, Côte d'Ivoire and Ghana). In 2005, petroleum consumption in West Africa averaged 487,000 bbl/d, with Nigeria being the Community's largest oil consumer (63 percent of total consumption).

## Exploration and Production

*Nigeria*

In recent months, Nigeria has experienced increased pipeline vandalism. In October 2005, a pipeline fire in the south-western Delta State of Nigeria resulted in the deaths of about 60 people. This was followed by a December attack, in which armed men in speed boats dynamited Shell's pipeline in the Opobo Channel. In January 2006, a pipeline attack from the Brass Creek fields to the Forcados terminal forced Shell to announce a *force majeure* on Forcados commitments to end-February. Additional attacks made on the pipeline and the Forcados terminal in February made it necessary for Shell to extend the force majeure beyond the end-February date. Shell estimates that more than 450,000 bbl/d of its oil production is currently shut-in because of the attacks. A February 2006 attack on the Escravos pipeline, that supplies oil to the Warri refinery, caused the refinery to shutdown. Officials are unsure of how long it will take to repair the damage. Nigeria had re-commissioned the Escravos-Warri pipeline in January 2005 after 18 months of repairing the damage caused by sabotage during the 2003 Niger Delta Crisis. In addition to pipeline vandalism, Nigeria has seen an increase in kidnappings of expatriate oil workers in the Niger Delta region. In January 2006, four foreign employees of Royal Dutch Shell were kidnapped and then held for 19 days before being released on "humanitarian grounds". In February 2006, nine additional oil workers were kidnapped in the Niger Delta region. On March 3, 2006, six of the nine hostages were released, with the remaining three being released on March 27, 2006. The Movement for the Emancipation of the Niger Delta (MEND) is taking responsibility for the kidnappings and for blowing up a crude oil pipeline owned and operated by Royal Dutch Shell.

Despite recent attacks on Shell's oil facilities in the Niger Delta region, the company's deepwater Bonga field began producing oil at the end 2005. Bonga is estimated to hold recoverable reserves of 600 million barrels of oil. At peak production, the field will produce around 225,000 bbl/d and 150 million cubic feet (MMcf) of natural gas. Oil from the field will be stored in a floating production, storage and offloading (FPSO) unit, with a storage capacity of 2.0 million barrels.

ExxonMobil produces around 750,000 bbl/d of oil in Nigeria. The company plans to invest $11 billion in the country's oil sector through 2011, with the hope of increasing production to 1.2 million bbl/d. The majority of the increase will occur at the Erha field, which is located on Block OPL 209. ExxonMobil began producing oil from Erha in April 2006. Output from the field is expected to reach 150,000 bbl/d by the third quarter of 2006, and rise to 190,000 bbl/d by the end of the year. Oil from Erha is stored in an FPSO, with a storage capacity of 2.2 million barrels oil. ExxonMobil uses Very Large Crude Carriers (VLCC), capable of holding up to 300,000 deadweight tons to export the oil from the terminal. The company also operates the Yoho field, with current full-field output of around 150,000 bbl/d. Yoho contains around 400 million barrels of oil reserves. ExxonMobil is continuing to expand Yoho field and estimates the expansion project will increase production to 170,000 bbl/d by the third quarter of 2006. The $1.2 billion field is located in the shallow waters of Block OML 104. ExxonMobil's Bosi, and Eti/Asasa fields with capacities of 120,000 bbl/d, and 25,000 bbl/d, respectively, are scheduled to come online between 2006 and 2007.

Nigeria shares a Joint Development Zone (JDZ) with neighboring São Tomé and Príncipe (STP), which contains 23 exploration blocks. Nigeria and Sao Tome have agreed to split revenues from the blocks on a 60:40 basis, respectively. Block One is currently the only block in the JDZ undergoing development. The block is controlled by Chevron (51 percent), with partners ExxonMobil (40 percent) and Equity Energy Resources (9 percent). Preliminary studies have indicated that the block could contain sizable amounts of oil (up to 1 billion barrels). If recoverable oil is located, Chevron plans to bring it onstream by 2010. Blocks Two through Six were also awarded, of which, three have been approved for PSAs, while the remaining two have yet to be signed. Meanwhile, several independent U.S. based companies that were awarded shares in the blocks have relinquished their awards. Pioneer Natural Resources stated a failure to agree to specific terms of operation on Block Two as the reason for its withdrawal from the project. Pioneer's withdrawal has opened the door for China's oil and gas company, Sinopec, to invest in the JDZ. For more information on the oil sector in Nigeria, please see the Nigerian Country Analysis Brief.

*Côte d'Ivoire*

In August 2005, Canadian Natural Resources (CNR) brought their Baobab oil field onstream, with initial production averaging 48,000 bbl/d. The field is located offshore in Block CI-40 and production on the field is expected to reach capacity of 65,000 bbl/d in 2006. Block CI-40 is estimated to contain 200 million barrels of recoverable oil reserves. CNR is operator of the block with a 57.6 percent interest and is joined with partners Svenska Petroleum Exploration (27.4 percent), Petroci Overseas (10 percent), and Petroci Holding (5 percent). CNR is also operator of

Block CI-26 and holds an interest in Block CI-400. The Espoir field, which is located in Block CI-26, had first oil come onstream in 2002. Espoir's recoverable reserves are estimated at 93 million barrels of oil and 180 billion cubic feet (Bcf) of natural gas. Production at the field, which has a life expectancy of 20 to 25 years, is expected to peak at 35,000 bbl/d of oil. Espoir's oil production is exported by shuttle tanker, while the natural gas is piped to shore where it is used to generate electricity. CNR announced that development of the West Espoir field began in mid-2005, with production expected to start in mid-2006. CNR holds 58.7 percent interest in Block CI-26 and is joined with partners Tullow Oil (21.3 percent) and Petrosi (20 percent). In 2003, Tullow Oil discovered oil in the Acajou prospect, also located on Block CI-26.

Devon Energy Corporation operates the Lion oil field on Block CI-11, with production averaging 20,000 bbl/d of oil. Recoverable oil reserves on the block are estimated to be 210 million barrels. Devon's partners on Block CI-11 include Petroci, Pluspetrol of Argentina, and the International Finance Corporation. In addition to Block CI-11, Devon holds interests (ranging from 35 percent to 80 percent) in several other blocks in Côte d'Ivoire including offshore Block CI-01, which contains the Kudu, Eland and Ibex fields; Block CI-02, which contains the Gazelle field and Block CI-105.

Vanco Energy Company has estimated that 2.7 billion barrels of oil is located in the San Pedro ridge and other deposits in Block CI-112 off the western coast of Côte d'Ivoire. India's Oil and Natural Gas Corporation (ONGC) (21.2 percent), Oil India (10.4 percent) and China's Sinopec (27 percent) signed on to the CI-112 project in December 2004, reducing Vanco's stake to 27 percent. This is the first African deepwater exploration venture for all three state-owned firms. In March 2005, Vanco drilled the San Pedro 1 well on Block CI-112, but later plugged the well due to a lack of hydrocarbons. In October 2005, Vanco signed two production sharing agreements (PSAs) with Côte d'Ivoire for Blocks CI-401 and CI-101. For more information on the oil sector in Côte d'Ivoire, please see the Côte d'Ivoire Country Analysis Brief.

*Ghana*

In 2005, Saltpond Offshore Producing Ltd (SOPL), which is owned by the U.S.-registered Lushann-Eternit (60 percent) and the state-owned Ghanaian National Petroleum Company (GNPC) (40 percent), signed a $5 million redevelopment project that will restart six wells on the Saltpond oil and natural gas field. SOPL hopes the additional wells will increase production from the current 500 bbl/d to 1,500 bbl/d. The former operator of Saltpond field, Agripetco, had shut the field down in 1985 due to decreasing output.

Scottish-based Dana Petroleum is currently analyzing exploration targets in the deepwater section of its West Tano Block. The company previously drilled two successful test wells, WT-1X and WT-2X on Tano field, and made estimates that the field contained oil reserves of 200 million barrels. However, Dana Petroleum indicated that only a small amount of the oil would be recoverable due to geological reasons. Dana Petroleum operates the block with 90 percent interest and is joined with GNPC (10 percent).

In 2002, Oklahoma-based Devon Energy and Canadian independent EnCana entered into an agreement with the GNPC to explore for hydrocarbons offshore of southeastern Ghana in the Keta Basin. The companies are currently analyzing seismic data on the Keta Block. Devon has been active in Ghana since 1997 when it acquired the Keta concession. Houston-based Vanco Energy also signed an exploration agreement with the Ghanaian government in August 2002. In May 2005, Vanco Energy completed 3D seismic research on its Cape Three Points Deepwater Block, and the company plans to drill its first exploration well on the block in 2006. Finally, Dallas-based, Kosmos Energy signed a seven-year oil exploration agreement with Ghana. Kosmos will search for oil in the Tano Basin, adjacent to Vanco Energy's Cape Three Points Deepwater Block. Kosmos is operator of the West Cape Three Points license with 86.5 percent interest and is joined with GNPC (10 percent) and E.O. Group (3.5 percent).

*Senegal*

In 2006, Hunt Oil plans to conduct seismic research on the Sangomar-Rufisque license offshore Senegal. Analysts estimate that the license area could contain upwards of 1 billion barrels of recoverable oil. Hunt Oil is the operator of the license with a 60 percent interest, and is joined with partners First Australian Resources (30 percent) and state-owned Societe des petroles du Senegal (Petrosen) (10 percent).

In March 2005, Malaysian-based, Markmore Energy acquired a 55 percent stake in the Dome Flore Block. The block is located in a joint maritime exploration zone, which is controlled by Senegal and Guinea-Bissua and administered by the Agence de Gestion et de Cooperation

(AGC). The Dome Flore Block contains an estimated 800 million barrels of heavy oil. Thirteen wells have been drilled on the block, and several have penetrated 10 - 13 API heavy oil deposits. Additionally, two wells have found much smaller deposits of 30 - 35 API light oil. Markmore Energy is joined with partners Sterling Oil (UK) (30 percent) and AGC (15 percent).

Eni, as operator of the AGC-administered Cheval Marin Block, has a 48 percent interest and is joined with ExxonMobil (37 percent), Sterling Oil (10 percent) and AGC (15 percent). Seismic surveys were completed on the Cheval Marin Block in April 2002, and additional seismic surveys are being planned.

*Guinea-Bissau*

In March 2002, U.K.-independent Premier Oil announced the results of its first exploratory well on the Sinapa prospect (Block 2) offshore Guinea-Bissau. The Sinapa-1 exploratory well has been designated plugged and abandoned with oil shows. Despite the disappointing results, Premier Oil plans to retain its acreage in Guinea-Bissau, and is in the process of reviewing seismic data on its holdings. In addition, Premier Oil plans to drill exploration wells, Eirozes and Espinafre, towards the end of 2006. The national oil company of Guinea-Bissau, Petroguin, is planning to offer the country's new deep-water acreage to prospective investors. Exploration activity in the region has sparked interest in the remaining 11 offshore blocks.

*The Gambia*

In July 2005, The Gambia awarded Philippine National Oil Company (PNOC) one of The Gambia's six oil exploration blocks. The Gambia gave the award to PNOC without tender, or a technical review of the company's capabilities. Amerada Hess (80 percent interest) and Sterling Energy (20 percent) hold the rights to The Gambia's Deepwater PPL Block. The license has been issued for six years and the companies are currently finalizing interpretation studies and evaluating options for a 3D seismic data acquisition.

*Benin and Togo*

In Benin, U.S.-based independent Kerr-McGee has exploration plans for Block 4, which include 3D seismic research and an anticipated drilling in late 2006. Kerr-McGee (operator) holds a 40 percent interest in the block and is joined with partners Kosmos Energy (40 percent) and Malaysia's Petronas (20 percent). In neighboring Togo, Petronas and Hunt Oil are exploring for oil. Hunt Oil signed a PSC with Togo in late July 2002 for the country's first deepwater well. In addition, Togo awarded Hunt Oil the exclusive rights to the country's entire offshore area. The contract area, previously divided into 15 blocks, covers 1,570 square miles.

*Other ECOWAS Members*

Although the Mano River States (Liberia, Guinea and Sierra Leone) currently produce no hydrocarbons, sporadic exploration activity is taking place. In 2005, Liberia held its first licensing round since the cessation of its civil war in 2003. Liberia awarded exploration concessions to UK-based Regal Petroleum, Repsol, Woodside, Broadway Consolidated and Oranto Petroleum. In addition, Canadian-based Ona Exploration signed a Memorandum of Understanding (MoU) with the Liberian government for oil and natural gas drilling rights in two offshore concessions. In Guinea, Houston's HyperDynamics has been meeting with government officials to discuss hydrocarbon development plans in the country. The company has exploration and data marketing rights for the entire continental margin of Guinea, which covers 210 miles of coastline and up to 150 miles offshore. In October 2005, Sierra Leone signed an agreement with Nigerian's oil and natural gas company, Frazimex, allowing the company to explore for oil in Block 3 for seven years. Several test wells drilled in the 1970's on Sierra Leone's continental shelf produced "shows" of oil.

To date, no proven hydrocarbon reserves have been found in Mali. However, many oil companies are currently exploring for oil, with focused exploration on the Taoudeni basin and the Graben de Gao in the northwest of the country. In Niger, the China National Petroleum Corporation (CNPC) is choosing three sites to drill exploration wells in its Tenere Block. CNPC's contract states that the drilling must be completed by 2008. In Petronas' and ExxonMobil's Agadem Block, the companies discovered an estimated 350 million barrels of oil equivalent. Oil exploration has been carried out for more than 20 years in Niger's Djado region on the border with Libya, but no commercial finds have been discovered.

***Nigeria has the majority of oil refineries in the ECOWAS region.***

## Refining

West Africa's petroleum refining capacity is concentrated in Nigeria. Nigeria's refining capacity is currently insufficient to meet domestic demand, forcing the country to import petroleum products.

Nigeria's state-held refineries (Port Harcourt I and II, Warri, and Kaduna) have a combined nameplate capacity of 438,750 bbl/d, but problems including sabotage, fire, poor management and a lack of regular maintenance contribute to the current operating capacity of around 214,000 bbl/d. The Nigerian government is granting permits to build several independently-owned refineries in Nigeria. Sapele Petroleum Limited is waiting for final approval to construct a $105-million, 120,000 bbl/d oil refinery in Delta State. The refinery is one of the more probable to be built and could save Nigeria as much as $2 billion in costs for refined petroleum imports. Other ECOWAS refineries are located in Côte d'Ivoire(Abidjan, 65,200 bbl/d); Ghana (Tema, 45,000 bbl/d); Liberia (Monrovia, 15,000 bbl/d); Senegal (Dakar, 27,000 bbl/d) and Sierra Leone (Freetown, 10,000 bbl/d).

Côte d'Ivoire's refining facilities consist of the 65,200-bbl/d SIR refinery and an adjacent 10,000-bbl/d asphalt plant (Société Multinationale de Bitumes-SMB) in Abidjan. An oil pipeline connects the SIR refinery to the Lion and Panther fields. The refinery also receives crude oil from Nigeria. The state currently owns 47.27 percent of SIR, and expects to retain a 10 percent interest after privatization. Burkina Faso owns a 5.39 percent stake in SIR, and Total, Shell, ExxonMobil and ChevronTexaco own the remainder.

The government of Ghana plans to partially privatize its Tema Oil Refinery (TOR) in 2006 in order to raise money for infrastructure developments in the country. In addition, plans are being made to increase TOR's capacity to 100,000 bbl/d. Currently, TOR's 45,000 bbl/d capacity meets about 80 - 85 percent of Ghana's demand for petroleum products. Ghana hopes to raise $6 million from the sale of TOR and other state-run businesses.

## Natural Gas

***West Africa contains approximately one-third of all proven natural gas reserves in Africa.***

West Africa contains approximately 32 percent of Africa's total natural gas reserves. Nigeria holds the Community's largest proven reserves with 185 trillion cubic feet (Tcf) (see Table 4). However, proven reserves are also located in Côte d'Ivoire (1.0 Tcf), Ghana (840 billion cubic feet; Bcf), and Benin (40 Bcf). Although natural gas is still in early stages of use in the region, several projects are under way that should increase the future use of the resource.

### *Nigeria*

According to 2006 estimates by the *Oil and Gas Journal* (*OGJ*), Nigeria is the seventh largest natural gas reserve holder in the world and the largest in Africa. In October 2004, Nigeria announced that its natural gas reserves could be as high as 660 Tcf. The government plans to raise earnings from natural gas exports to 50 percent of oil revenues by 2010. However, the Nigerian National Petroleum Company (NNPC) estimates that $15 billion in private sector investments is necessary to meet its natural gas development goals by 2010.

The vast majority of natural gas found in Nigeria is associated, meaning that it occurs in crude oil reserves as free gas. Because many of the fields lack the infrastructure to produce the associated natural gas, it is flared. Nigeria flares more natural gas than any other country in the world, with 43 percent of its total annual natural gas production being flared. NNPC estimates that Nigerian flared natural gas accounts for approximately 20 percent of the world total. Nigeria is working to end natural gas flaring by 2008. However, Shell announced in its 2004 People and Environment Annual Report that it would not be able to meet the 2008 goal of eliminating natural gas flaring.

A significant portion of Nigeria's natural gas is processed into liquefied natural gas (LNG). Nigeria's most ambitious natural gas project, the $3.8 billion liquefaction facility on Bonny Island, was completed in September 1999. In January 2006, NLNG sent its first shipment of LNG exports to the United States from its newly-commissioned fourth train. The company's fifth train began operating in January 2006 as well. The additional two trains have increased annual production capacity to 17 million tons per year of LNG. Plans have been approved for a sixth train (to come online in 2007), which is expected to bring total capacity to 22 million tons per year. The facility is currently supplied from dedicated (non-associated) natural gas fields, but it is anticipated that within a few years half of the input natural gas will consist of associated (currently flared) natural gas from existing oil fields. In January 2005, ExxonMobil signed an MOU with NNPC to study the possibility of constructing a second LNG plant on Bonny Island to come online in 2010. The plant would produce around 4.8 million tons per year of LNG.

### *Côte d'Ivoire*

According to 2006 estimates by the *OGJ*, Côte d'Ivoire has 1.0 Tcf of proven natural gas reserves. Although exploration teams first discovered natural gas in Côte d'Ivoire in the 1980's, it wasn't until the mid-1990's that companies began to develop the resource. In 2003, Côte d'Ivoire

produced 50 Bcf of natural gas, while consuming 46 Bcf. The Ivoirian government estimates that natural gas consumption will grow by 50 percent over the next three years.

Côte d'Ivoire's largest producing natural gas field is the Foxtrot field in Block CI-27. Foxtrot contains estimated recoverable natural gas reserves of 650 Bcf, and the field produces around 80 MMcf/d. The Manta field is also located in Block CI-27 and in December 2005, the Mahi-1 well began producing natural gas at 32 MMcf/d. The Block is operated by Foxtrot, with a 24 percent interest and partners include Petroci (40 percent), SECI; a member of the Bouygues group of France (24 percent), and Energie de Côted'Ivoire (Enerci); a joint venture of Gaz de France and EdF Group (12 percent).

*Senegal*

Senegal's natural gas reserves are primarily located onshore. In October 2002, U.S.-independent Fortesa International began natural gas production from the onshore Gadiaga Development Area, with current production at two MMcf/d of natural gas. Fortesa holds a 70 percent stake in Gadiaga, with the remaining 30 percent held by Petrosen, the Senegalese national oil company. In December 2005, Fortesa's Sadjiratou-1 natural gas well tested positive and the company has plans to drill another test well in 2006. Petrosen anticipates that Tullow Energy, Hunt Oil and Edison will drill additional test wells in 2007.

*West African Gas Pipeline*

The most significant natural gas development project is the West African Gas Pipeline (WAGP) project. The WAGP will traverse 620 miles both on and offshore from Nigeria's Niger Delta region to the Volta River Authority's power plant at Takoradi, Ghana. The $600 million WAGP will initially transport 120 MMcf/d of gas to Ghana, Benin and Togo. In September 2005, WAGP began laying the 353-mile main offshore segment of the pipeline offshore Ghana. The pipeline is being laid approximately 12 miles offshore at a rate of up to two miles per day. Tie-in points will take natural gas to metering and custody transfer stations at Lome in Togo and Cotonou in Benin. Completion of the pipeline installation is projected for December 2006. Natural gas deliveries are expected to be at 400 MMcf/d when the pipeline is functioning at its capacity (approximately 15 years after construction).

In February 2003, the four nations involved in the WAGP signed an agreement on the projects implementation. The treaty, which is for a 20-year period, provides for a comprehensive legal, fiscal and regulatory framework, as well as a single authority for the implementation of the project. The WAGP partners are ChevronTexaco with 36.7 percent, NNPC with 25 percent, Shell with 18 percent, Ghana's Takoradi Power Company with 16.3 percent and Societe Beninoise de Gas and Societe Togolaise de Gas each with a 2 percent interest.

## Electricity

***Thermal electricity constitutes the majority of electricity generated in the ECOWAS region.***

Only about one in three ECOWAS citizens currently has access to electricity and analysts predict that electricity demand in the Community will increase by five percent annually over the next 20 years. West Africa's total installed electric generating capacity was 9.8 gigawatts (GW) at the beginning of 2003, the majority of which is thermal (see Table 5). Total electricity generation for the region in 2003 was 31.0 billion kilowatthours (Bkwh), with Nigeria (15.7 Bkwh), Ghana (8.8 Bkwh) and Cote d'Ivoire (5.1 Bkwh) being the largest generators. In 2003, total regional electricity consumption was 28.4 Bkwh, led by Nigeria (14.5 Bkwh, 50.1 percent). Ghana (5.1 Bkwh, 17.8 percent), Cote d'Ivoire (3.4 Bkwh, 12.0 percent) and Senegal (1.2 Bkwh, 4.3 percent) were the next largest electricity consumers.

*Nigeria*

The Nigerian power sector operates well below its estimated capacity, with power outages being a frequent occurrence. According to Power Holding Company of Nigeria (PHCN), the country's peak electric demand in February 2006 was 7,600 megawatts (MW), but actual generation capability was 3,600 MW. The discrepancy between electricity demand and actual generation is mostly due to low water levels and inadequate plant maintenance. During 2005, electricity generation capacity fluctuated between 2,600 MW and 3,600 MW. The hydropower stations Kainji, Jebba, and Shiroro have seen generation affected by insufficient water, and the Lagos Egbin, Delta, and Port Harcourt Afam plants are also operating at below capacity due to poor maintenance.

Only 40 percent of Nigerians have access to electricity, the majority of whom are concentrated in urban areas. Despite endemic blackouts, customers are billed for services rendered, partially explaining Nigeria's widespread vandalism, power theft and PHCN's problems with payment

collection. Nigeria's Bureau of Public Enterprises (BPE) hopes to see increased stability in Nigeria's electricity sector once the definite privatization of PHCN takes place.

*Ghana*

Hydroelectricity is the primary source of Ghana's power. Ghana's current hydroelectric capacity of 1.2 GW is located at Akosombo (912 MW) and Kpong (160 MW). In 2005, the turbines of the Akosombo generation station underwent retrofitting to increase its installed capacity by about 108 MW. The Ghanaian government is considering additional hydroelectric projects to be built on a Build Operate Transfer (BOT) financing scheme. One of these proposed projects is the $700-million, Bui hydroelectric project, which would be located on the Black Volta and have a generation capacity of 400 MW. In addition to increasing the domestic electricity supply, power generated from Bui could be exported to Burkina Faso, Mali and Côte d'Ivoire. An investment decision on the Bui hydroelectric project is to be made by the end of 2006, and a maximum of five years would be needed to complete the project. Additional hydroelectric projects include the Hemang and Juale hydroelectric power dams (operational by 2015) and the Pwalugu hydroelectric power dam (operational by 2020). The generation capacity of Hemang, Juale and Pwalugu would be developed to 93 MW, 87 MW, and 48 MW respectively.

In addition to increasing hydroelectric output, Ghana plans to increase and expand thermal generating capacity. Current thermal facilities are located at Tema and Takoradi. Additional capacity is planned at Tano (gas-fired barges) and at Tema. Volta River Authority (VRA) and GNPC have constructed transmission lines and substations at Essiama and Elubo in the Western Region to feed the power generated at Tano into the national grid.

The WAGP, which will transport natural gas from Nigeria to the Takoradi power plant in Ghana, is expected to deliver the first natural gas in December 2006. The transmission pipeline will provide Ghana (in addition to Benin and Togo) with a reliable energy infrastructure and competitively priced natural gas. In March 2006, the minister for energy of Ghana announced that the International Finance Corporation (IFC) of the World Bank Group had given approval for negotiations on financing the expansion of the Aboadze thermal power plant at Takoradi. The cost of the expansion project is estimated at $215 million. The upgrade would convert the plant from burning crude oil to natural gas, which it would receive from Nigeria through the WAGP. CMS Energy, a US-based company, has a 90 percent stake in the Takoradi facility, and the VRA holds the remaining 10 percent.

The Electric Company of Ghana (ECG) is responsible for electricity distribution to the Ashanti, Western, Central, Eastern, Greater Accra and Volta regions. VRA is responsible for generation and for the distribution of electricity in the Brong Ahafo, Northern, Upper East and Upper West regions. When the WAGP is completed, VRA plans to convert oil-fired facilities at Takoradi and Tema to natural gas.

*Côte d'Ivoire*

Côte d'Ivoire's natural gas-powered stations generate more than half of the country's annual production. In 1995, Côte d'Ivoire built their first natural gas-fired plant, Vridi II, near Abidjan. In 1999, the 288-MW Azito power station came online. Azito produces more than a third of the country's power. The phased construction of a third turbine in Azito has been delayed pending a satisfactory rise in domestic and regional demand for electricity, through the West African Power Pool (WAPP). In May 2005, Alstom signed a 10-year service contract for the Azito plant. In addition to natural gas-powered stations, Côte d'Ivoire also uses hydroelectric plants to generate electricity. Although they no longer run at full capacity, hydroelectric plants (Ayame I and II, Kossou, Taabo, Buyo and Grah) continue to generate about 17 percent of the country's electricity. Ivoirians also use individual fuel-powered generators throughout much of the country.

*Senegal*

Due to the fuel shortages, massive blackouts have recently affected Senegal's capital, Dakar. In April 2006, Morocco's Samir oil refinery agreed to ship fuel to Senegal's power company, the Societe Nationale d'Electricite (SENELEC) in order to return electricity generation to normal in the country. Samir has also agreed to help construct fuel storage facilities and to examine the possibility of building a new oil terminal in Senegal.

In June 2005, the African Development Bank (ADB) approved a $10 million loan to finance the development of the Kounoune thermal power project. The project consists of three components: construction and operation of a 67.5 MW heavy diesel-fuel plant based on a Build-Own-Operate contrac, the construction of a fuel supply pipeline (heavy fuel) connecting the plant to the fuel

source, and a substation linking the plant to the SENELEC power grid. Senegal and the ADB hope the project will help meet the county's growing demand for electricity.

*Other ECOWAS Members*

Liberia plans to rebuild electricity generation and distribution infrastructure that was damaged or destroyed during the civil war. The first electrification goal is at the minimum to bring electricity to central Monrovia by July 26, 2006. President Johnson-Sirleaf also has long-term plans to privatize the Liberia Electricity Corporation (LEC) to facilitate in making it more functional and serviceable for Liberians.

In June 2005, the government of Sierra Leone, with the support of the World Bank, ADB and Italy decided to undertake the completion of the Bumbuna hydroelectric project. The project had been nearly complete (85 percent) when civil war disrupted the construction in 1997. The Bumbuna project includes construction of a dam, water intake structures, spillways, and two 25 MW turbo-generators. To date, only the power house has yet to be constructed, and completion of the project is expected in 2008. The total project cost is estimated to be $53.8 million.

Guinea is the source of several major West African rivers (including the Gambia and Niger Rivers) and has a hydroelectric potential (technically feasible) estimated at 19,400 Gigawatthours per year (Gwh/yr). Only about 1 percent of Guinea's technically feasible potential has so far been developed. The 75-MW Garafiri hydroelectric facility, on the Konkoure River, was commissioned in 1999; and an 80-MW project is planned 60 miles downstream at Kaleta. A 975 MW dam in Souapiti Kaleta has also been proposed, but the displacement of 50,000 inhabitants in the area has deterred international organizations from financing the project.

In Niger, the Islamic Development Bank (IDB) has taken the lead for funding the construction of the Kandadji hydroelectric project. To date, 80 percent of the funding is available. In 2005, Moroccan engineering and design firm Conseil, Ingenierie et Developpement won the $550,000 technical studies contract for the Kandadji dam. Kandadji, first conceived in the mid-1970's, will be located on the Niger River approximately 120 miles upstream of Niamey. The 165-MW facility (originally proposed to be 230 MW) is expected to cost $270 million.

## Regional Projects

*West African Power Pool (WAPP)*

In an effort to improve power reliability and encourage private sector investment, ECOWAS has been working to establish the West African Power Pool (WAPP). In October 2000, 14 ECOWAS members signed an agreement to launch a project to boost power supply in the region. The WAPP agreement reaffirmed the decision to develop energy production facilities and interconnect their respective electricity grids. In December 2003, ECOWAS Heads of State signed the ECOWAS Energy Protocol, which provides open and non-discriminatory access to power generation sources and transmission facilities. In order to fully establish the WAPP within ECOWAS, project managers have identified four phases of the project that will be carried out over a 20-year period. The first phase involves laying the ground rules for how the WAPP will function and linking interconnection lines between zone A countries (Burkina Faso, Côte d'Ivoire, Ghana, Niger and Togo) and zone B countries (Cape Verde, the Gambia, Guinea, Guinea Bissau, Liberia, Mali, Senegal and Sierra Leone). Completion of the first phase is set for the end of 2006. The second phase (2007 – 2012) includes building missing links along Nigeria's coastal line, development of new institutional entities and implementing policies from phase one. Phases three and four (2012 – 2023) involve making the system fully operational.

USAID has funded the planning for WAPP which included (1) ECOWAS Vision Statement and Action Plan for WAPP (2) agreements on rules for trading electricity (3) regional regulatory body (4) dispute resolution mechanism (5) mechanisms for cooperation to maintain grid stability and (6) training in energy modeling and forecasting. The World Bank has committed a $350 million credit for the development of WAPP. Of this amount, $40 million has been secured by Ghana to implement the 330 kv Aboadze-Volta transmission line. USAID-funded implementing partners working with ECOWAS and national utility corporations include PA Consulting, Nexant, Associates for International Resources and Development, Purdue University, and the U.S. Energy Association.

*Organization for the Development of the Senegal River (OMVS)*

The Organization for the Development of the Senegal River (OMVS), which consists of Mali, Mauritania and Senegal, has constructed two dams. Senegal completed the Diama dam in 1986 and its primary function is to stop the upstream encroachment of seawater from the Atlantic

Ocean. In 1987, Mali completed the Manatali dam, which OMVS built on the Bafing River, the main tributary of the Senegal River. The Manatali project was also to include a 200-MW power station and an 800-mile network of transmission lines to the capitals of Mali (Bamako), Mauritania (Nouakchott) and Senegal (Dakar). Cost overruns, coupled with political and military tensions between Mauritania and Senegal initially canceled the construction of the power facilities. In March 2000, ADB approved a $33.5 million loan for the Manatali energy project. The Manatali's generating facilities came online in December 2001, supplying power to Mali's grid. Senegal connected its power grid to Manatali in July 2002 and Nouakchott was connected in November 2002. The OMVS signed a new charter in May 2002 to allocate water resources and hydroelectric power, and approved the restructuring of the Manatali Water Management Company (SOGEM). SOGEM will maintain ownership of infrastructure and equipment at Manatali, but Eskom will handle marketing and distribution of power generated at Manatali.

Since 2004, OMVS has been conducting a feasibility study on the construction of the Felou hydroelectric power plant (60 MW) in Mali. In February 2006, the European Commission and the European Investment Bank set up a trust fund for infrastructure in Africa that is expected to finance the construction of the Felou power plant and an interconnection between grids in Malawi and Mozambique. The trust fund has a $422 million budget, which will be coupled with loans from the European Bank.

*Organization for the Development of the River Gambia (OMVG)*

In 2004, the ADB agreed to issue a $5.4 million grant to finance the study on electricity production and transmission to the member states of the Organization for the Development of the River Gambia (OMVG), a regional organization whose members are The Gambia, Guinea, Guinea Bissau and Senegal. The focus of the study will be the Sambangalou hydroelectric project on the Gambia River in The Gambia, the Kaleta dam on the Konkoure River in central Guinea, and regional integration of power grids in the four countries. A larger production of hydropower is set to help end the persistent problem of power shortages and the heavy dependence on imported petroleum products for the production of electricity.

# Tables

**Table 1: Economic and Demographic Indicators**

| Country | Gross Domestic Product (GDP), 2005E (Billions of U.S. $) | Real GDP Growth Rate, 2005E (percent) | Real GDP Growth Rate, 2006F (percent) | Per Capita GDP, 2005E | Population 2005E (millions) |
|---|---|---|---|---|---|
| Benin | $4.3 | 4.8 | 5.2 | $604 | 7.1 |
| Burkina Faso | $5.2 | 3.5 | 4.2 | $407 | 12.7 |
| Cape Verde | $1.1 | 5.9 | 6.2 | $2,136 | 0.5 |
| Cote d'Ivoire | $16.3 | 1.1 | 2.2 | $937 | 17.3 |
| Gambia | $0.5 | 4.5 | 4.7 | $348 | 1.5 |
| Ghana | $10.2 | 5.7 | 5.9 | $484 | 21.0 |
| Guinea | $3.0 | 3.0 | 3.3 | $357 | 8.2 |
| Guinea-Bissau | $0.3 | 2.3 | 2.8 | $223 | 1.4 |
| Liberia | $0.5 | 7.5 | 6.8 | $137 | 3.6 |
| Mali | $5.3 | 5.8 | 6.2 | $441 | 12.1 |
| Niger | $3.3 | 3.5 | 3.8 | $268 | 12.5 |
| Nigeria | $78.0 | 5.9 | 6.4 | $611 | 127.7 |
| Senegal | $8.1 | 5.8 | 5.2 | $780 | 10.4 |
| Sierra Leone | $1.1 | 6.9 | 6.3 | $205 | 5.5 |
| Togo | $2.1 | 2.8 | 3.5 | $417 | 5.1 |
| Regional Total/Weighted Average | $139.3 | 5.0 | 5.5 | $624 | 246.6 |

**Source: Global Insight**

**Table 2: Total Energy and Carbon Dioxide Emissions, 2003**

| Country | Total Energy Consumption, (Quadrillion Btu) | Total Energy Production, (Quadrillion Btu) | Net Energy Exports, (Quadrillion Btu) | Carbon Dioxide Emissions (Million metric tons of carbon equivalent) |
|---|---|---|---|---|
| Benin | 0.026 | 0.001 | -0.025 | 0.47 |
| Burkina Faso | 0.018 | 0.001 | -0.017 | 0.31 |
| Cape Verde | 0.002 | 0.000 | -0.002 | 0.04 |
| Cote d'Ivoire | 0.101 | 0.136 | 0.035 | 1.46 |
| Gambia | 0.004 | 0.000 | -0.004 | 0.08 |
| Ghana | 0.126 | 0.061 | -0.065 | 1.49 |
| Guinea | 0.022 | 0.004 | -0.018 | 0.36 |
| Guinea-Bissau | 0.005 | 0.000 | -0.005 | 0.10 |
| Liberia | 0.007 | 0.000 | -0.007 | 0.14 |
| Mali | 0.015 | 0.007 | -0.008 | 0.17 |
| Niger | 0.016 | 0.005 | -0.011 | 0.33 |
| Nigeria | 0.985 | 5.604 | 4.619 | 25.49 |
| Senegal | 0.066 | 0.002 | -0.064 | 1.24 |
| Sierra Leone | 0.014 | 0.000 | -0.014 | 0.26 |
| Togo | 0.019 | 0.000 | -0.019 | 0.34 |
| Regional Total | 1.426 | 5.821 | 4.395 | 32.28 |

**Sources: EIA, *International Energy Annual, 2003***

**Table 3: Petroleum Overview**

| Country | Petroleum Production, 2005 (Thousand Barrels Per Day) | Petroleum Consumption, 2005 (Thousand Barrels Per Day) | Net Petroleum Exports, 2005 (Thousand Barrels Per Day) | Crude Oil Reserves, 1/1/2006 (Million Barrels) | Crude Oil Refining Capacity, 1/1/2006 (Thousand Barrels Per Day) |
|---|---|---|---|---|---|
| Benin | 0 | 14 | -14 | 8.2 | 0.0 |
| Burkina Faso | 0 | 8 | -8 | 0.0 | 0.0 |
| Cape Verde | 0 | 1 | -1 | 0.0 | 0.0 |
| Cote d'Ivoire | 57 | 18 | 12 | 100.0 | 65.2 |
| Gambia | 0 | 2 | -2 | 0.0 | 0.0 |
| Ghana | 6 | 45 | -39 | 16.5 | 45.0 |
| Guinea | 0 | 9 | -9 | 0.0 | 0.0 |
| Guinea-Bissau | 0 | 3 | -3 | 0.0 | 0.0 |
| Liberia | 0 | 4 | -4 | 0.0 | 15.0 |
| Mali | 0 | 4 | -4 | 0.0 | 0.0 |
| Niger | 0 | 6 | -6 | 0.0 | 0.0 |
| Nigeria | 2,633 | 321 | 2,105 | 35,876 | 438.8 |
| Senegal | 0 | 34 | -34 | 0.0 | 27.0 |

| | | | | | |
|---|---|---|---|---|---|
| Sierra Leone | 0 | 7 | -7 | 0.0 | 10.0 |
| Togo | 0 | 11 | -11 | 0.0 | 0.0 |
| Regional Total | 2,696 | 487 | 1,975 | 36,000.7 | 601.0 |

**Sources: Energy Information Administration, *Oil and Gas Journal***

**Table 4: Natural Gas Overview (Billion Cubic Feet)**

| Country | Production, 2003 | Consumption, 2003 | Reserves, 1/1/2006 |
|---|---|---|---|
| Benin | 0 | 0 | 40 |
| Burkina Faso | 0 | 0 | 0 |
| Cape Verde | 0 | 0 | 0 |
| Cote d'Ivoire | 50 | 46 | 1,000 |
| Gambia | 0 | 0 | 0 |
| Ghana | 0 | 0 | 840 |
| Guinea | 0 | 0 | 0 |
| Guinea-Bissau | 0 | 0 | 0 |
| Liberia | 0 | 0 | 0 |
| Mali | 0 | 0 | 0 |
| Niger | 0 | 0 | 0 |
| Nigeria | 680 | 262 | 184,660 |
| Senegal | 2 | 2 | 0 |
| Sierra Leone | 0 | 0 | 0 |
| Togo | 0 | 0 | 0 |
| Regional Total | 732 | 310 | 186,540 |

**Sources: Energy Information Administration, *Oil and Gas Journal***

**Table 5: Electricity Overview, Billion Kilowatthours except where noted**

| Country | Consumption, 2003 | Generation, 2003 | Installed Capacity, 1/1/2003 (gigawatts) | Thermal Capacity (percent of total) | Hydroelectric Capacity (percent of total) |
|---|---|---|---|---|---|
| Benin | 0.54 | 0.07 | 0.12 | 44.2 | 55.8 |
| Burkina Faso | 0.35 | 0.38 | 0.12 | 73.3 | 26.7 |
| Cape Verde | 0.04 | 0.04 | 0.01 | 100.0 | 0.0 |
| Cote d'Ivoire | 3.42 | 5.13 | 0.92 | 33.3 | 66.7 |
| Gambia | 0.13 | 0.14 | 0.03 | 100.0 | 0.0 |
| Ghana | 5.08 | 5.36 | 1.31 | 9.8 | 90.2 |
| Guinea | 0.72 | 0.78 | 0.28 | 50.4 | 49.6 |
| Guinea-Bissau | 0.05 | 0.06 | 0.02 | 100.0 | 0.0 |
| Liberia | 0.47 | 0.51 | 0.33 | 100.0 | 0.0 |
| Mali | 0.76 | 0.82 | 0.28 | 46.4 | 53.6 |
| Niger | 0.26 | 0.23 | 0.11 | 100.0 | 0.0 |
| Nigeria | 14.46 | 15.59 | 5.89 | 67.1 | 32.9 |
| Senegal | 1.24 | 1.33 | 0.24 | 100.0 | 0.0 |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Sierra Leone | 0.24 | 0.26 | 0.12 | 96.7 | 3.3 |
| Togo | 0.65 | 0.17 | 0.04 | 92.5 | 7.5 |
| Regional Total | 28.41 | 30.87 | 9.82 | 57.8 | 42.2 |
| **Sources: EIA, *International Energy Annual, 2003*** | | | | | |

# Links

**EIA Links**

EIA - Country Information on Benin
EIA - Country Information on Burkina Faso
EIA - Country Information on Cape Verde
EIA - Country Information on Cote d'Ivoire
EIA - Country Information on Gambia
EIA - Country Information on Ghana
EIA - Country Information on Guinea
EIA - Country Information on Guinea-Bissau
EIA - Country Information on Liberia
EIA - Country Information on Mali
EIA - Country Information on Mauritania
EIA - Country Information on Niger
EIA - Country Information on Nigeria
EIA - Country Information on Senegal
EIA - Country Information on Sierra Leone
EIA - Country Information on Togo

**U.S. Government**

CIA World Factbook - Benin
CIA World Factbook - Burkina Faso
CIA World Factbook - Cape Verde
CIA World Factbook - Cote d'Ivoire
CIA World Factbook - Gambia
CIA World Factbook - Ghana
CIA World Factbook - Guinea
CIA World Factbook - Guinea-Bissau
CIA World Factbook - Liberia
CIA World Factbook - Mali
CIA World Factbook - Mauritania
CIA World Factbook - Niger
CIA World Factbook - Nigeria
CIA World Factbook - Senegal
CIA World Factbook - Sierra Leone
State Department: Bureau of African Affairs
State Department: Background Notes on Africa
United States Information Agency (USIA): Africa
United States Agency for International Development (USAID): Africa
USAID - West African Regional Program (WARP)

**General Information**

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African Union (AU)
BBC News: Africa
CNN News: Africa
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Economic Community of West African States
International Finance Corporation Sub-Saharan Africa Page
Mbendi Information Services
New Partnership for African Development (NEPAD)
Regional News from AllAfrica.com
United Nations Economic Commission for Africa (ECA)
Washington Post Africa Section
West African Economic and Monetary Union (UEMOA)
West Africa News

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World Bank: Africa Region Section

**Foreign Government Agencies**
Benin
Burkina Faso
Cape Verde
Cote d'Ivoire
Gambia
Ghana
Guinea
Liberia
Mali
Mauritania
Niger
Nigeria
Senegal
Sierra Leone
Togo

**Oil and Natural Gas**
Canadian Natural Resources (Cote d'Ivoire)
Dana Petroleum (Mauritania & Ghana)
ENI/Agip:
Fusion Oil:
Ghana National Petroleum Corp. (GNPC)
Hardman Resources (Mauritania)
Nigeria LNG (NLNG)
Ocean Energy (Cote d'Ivoire & Nigeria)
Petronas (Benin, Mauritania, Niger, & Togo)
Petrosen (Senegal)
Premier Oil (Guinea-Bissau)
Roc Oil (Mauritania)
Shell (Nigeria)
SIR (Cote d'Ivoire)
Vanco Energy:

**Electricity**
NEPA (Nigeria)
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SENELEC (Senegal)
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