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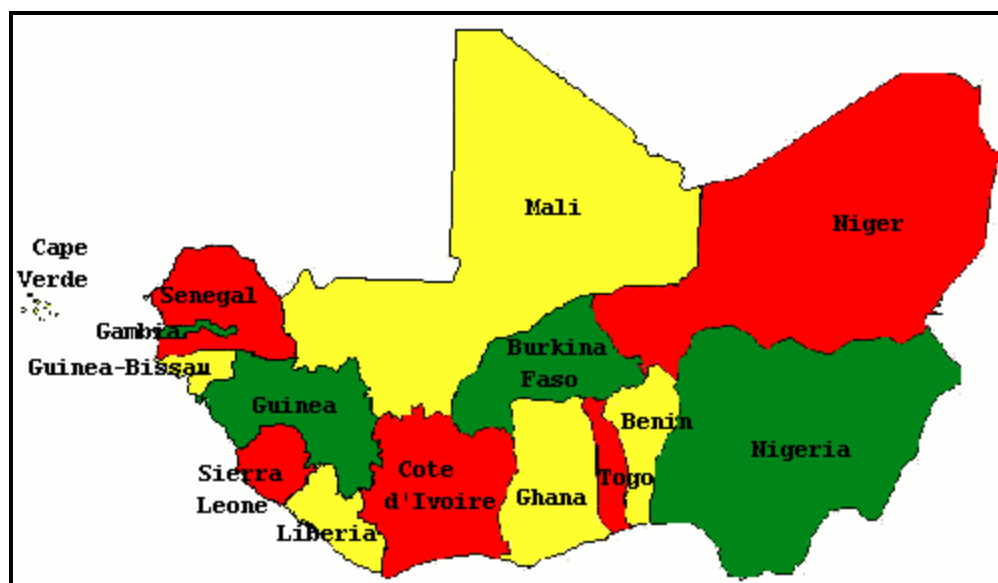
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## Economic Community of West African States (ECOWAS)

The following provides a brief economic and energy sector overview of the fifteen countries that make up the Economic Community of West African States (ECOWAS). Information on non-ECOWAS member [Mauritania](#) is also included. ECOWAS members include: Benin, Burkina Faso, Cape Verde, [Cote d'Ivoire](#), The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, [Nigeria](#), Senegal, Sierra Leone, and Togo.

*Note: The information contained in this report is the best available as of June 2003 and can change.*



### BACKGROUND

The Economic Community of West African States (ECOWAS) was created on May 28, 1975 in Lagos, Nigeria. ECOWAS was established to promote cooperation and integration in order to create an economic and monetary union for promoting economic growth

and development in West Africa. ECOWAS has encountered many problems in the process of regionally integrating West Africa, 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. Several ECOWAS-member countries are currently part of the West African Monetary Union (UEMOA), a regional economic and monetary union which shares a common currency (the CFA Franc). The Francophone-countries of Benin, Burkina Faso, Cote d'Ivoire, Mali, Niger, Senegal and Togo, with Guinea Bissau (Lusophone), comprise UEMOA.

Senegal's President, Abdoulaye Wade, is the current ECOWAS Chairman. President Wade is continuing the process of focusing on regional economic integration. In April 2002, the ECOWAS

Council of Ministers (COM) approved a new 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 new procedure will consist of National Approval Committees, which are to be set up by member states, to handle the approval of products to be granted exemption under TLS. The decision by COM, abrogates the decision of 1988 granting the COM the monopoly for approving applications for such exemptions. It followed the harmonization of the ECOWAS procedure with that of the UEMOA, which already operates under this procedure.

ECOWAS is seeking international support to enable it train and equip the 15 battalions of troops pledged by member states as standby units for its peacekeeping force, ECOMOG. The training of the composite units will facilitate their effectiveness in peacekeeping, humanitarian assistance and other missions for which they could be deployed. ECOMOG forces have been deployed previously in civil conflicts in Sierra Leone and Liberia. Senegal announced in November 2002 that it is to boost its contribution to the ECOWAS military mission to Cote d'Ivoire and provide the Force Commander. Five countries -- Benin, Ghana, Niger, Senegal and Togo -- are contributing the 1,264 troops for the first phase of the mission. The force will take over from French troops who have been monitoring the October 17, 2002 agreement for the cessation of hostilities under an agreement involving ECOWAS, France and the government of Cote d'Ivoire. Nigeria will also participate in the mission and it has pledged to provide medical and signal teams as its contribution. Talks continue with representatives of the Patriotic Movement for Cote d'Ivoire (MPCI), the rebel group which has taken control of several cities in the northern portion of the country.

### **ECONOMIC OVERVIEW**

In 2001, the combined Gross Domestic Product (GDP) for the ECOWAS region was estimated at \$75.1 billion (see [Table 1.](#)). ECOWAS economies are at varying stages of development. Nigeria's economy, the region's largest with a GDP of \$39.5 billion, is larger than the combined GDP of the other ECOWAS countries. While the region's economies grew at a combined rate of 3.4% in 2001, the substantial external debt of individual states remains one of the region's greatest challenges. Internal strife has adversely affected economic performance in several states.

Total regional exports, including intra-regional exports, were \$26.1 billion in 2001. ECOWAS had a \$2.5 billion trade surplus for 2001. 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). Overall trade between the United States and ECOWAS countries fell by 11.2% in 2001. U.S. exports to the region grew 23% in 2001, to nearly \$1.7 billion. U.S. imports, with Nigerian crude oil accounting for the vast majority, from the region fell by 15.3% in 2001, to \$9.6 billion. On December 31, 2002, President Bush approved the designation of 38 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. Burkina Faso, Liberia and Togo were the only countries in the region not covered by AGOA.

It was announced in November 2002, that the five member states of the proposed second monetary zone have postponed the date for the launching of their common currency, the Eco, from January 1, 2003 to July 1, 2005. The decision to postpone the launching was taken following the inability of the countries to satisfy the four convergence criteria for their economies prior to the introduction. The five states -- The Gambia, Ghana, Guinea, Nigeria and Sierra Leone, -- which signed the 2000 Accra Declaration for the creation of the second monetary zone agreed to reform their economies to meet specific targets prior to the introduction of the Eco. These include a restriction on budget deficit to no more than 4% by 2002, reducing inflation to 5% by 2003, a ceiling on central bank

financing of budget deficit to 10% of the previous year's revenue and a minimum foreign reserve that would support at least six months of imports by 2003. The Eco will circulate simultaneously with the CFA Franc for a specific period prior to the creation of a single currency for West Africa. Liberia, which attended some meetings of the new zone, indicated interest in the membership but it has not signed the Accra Declaration formalizing membership. Cape Verde has attended some meetings of the zone as observer.

## **ENERGY OVERVIEW**

Nigeria is ECOWAS's only net energy exporter, and the size of its exports alone makes the region a net energy exporter. In 2001, the countries of West Africa collectively consumed (see [Table 2.](#)) 1.48 quadrillion British thermal units (Btu) of commercial energy (0.4% of total world consumption) and produced 5.70 quadrillion Btu (1.4% of total world production). Also in 2001, the region generated 31.7 million metric tons of carbon emissions (0.5% of the world total). Nigeria accounted for 61.9% (0.92 quadrillion Btu) of energy consumption, 96.3% (5.49 quadrillion Btu) of energy production, and 74.2% (23.52 million metric tons) of the region's carbon emissions.

Commercial energy resources in the region, primarily petroleum and natural gas, are concentrated in coastal and offshore regions. Electricity in West Africa is generated through thermal (58.8% of installed capacity) or hydroelectric (41.2%) resources. Natural gas has the potential to take a more significant role in the region's energy sector as fields in Nigeria, Cote d'Ivoire and Senegal are developed. Due to the region's relatively small urban population (approximately 33.9%) and the lack of infrastructure, access to commercial energy sources is limited.

## **PETROLEUM**

Nigeria, West Africa's only significant oil producer, had oil production averaging 2.118 million barrels per day (bbl/d) in 2002 (see [Table 3](#)). Nigerian oil production has averaged 2.219 million bbl/d for the first three months of 2003. OPEC (Organization of Petroleum Exporting Countries) statistics list Nigeria's estimated proven crude reserves at 31.5 billion barrels, and this constitutes 96% of the region's estimated proven crude reserves. Smaller reserves are located in the Gulf of Guinea (offshore Benin, Cote d'Ivoire and Ghana), in the Atlantic Ocean (offshore Mauritania and Senegal) and in landlocked Niger. Nigeria is the region's largest oil consumer (nearly 60% of the region's total).

### **Exploration and Production**

Nigeria has the potential to significantly increase its crude oil production in the next few years as recent discoveries come on stream. ExxonMobil has launched its construction work on Nigeria's deep-water Erha field, which is estimated to contain 500 million barrels of reserves. At maturity Erha should yield 150,000 bbl/d, with first oil expected in 2005. ExxonMobil holds a 56.25% share and operates Block OPL-209 (the block where Erha is located), under a production-sharing contract (PSC) with Nigerian National Petroleum Corporation (NNPC). Shell is the other partner on OPL-209. Erha's \$1.1-billion field development is expected to include a Floating Production Storage and Offloading vessel (FPSO), 15 producing wells, five water injection wells, and four gas injection wells.

Work is continuing on Shell's massive Bonga deep-water development, which has the potential to produce 225,000 bbl/d. Bonga is estimated to contain 700 million barrels and it is scheduled to come on stream in early 2004. Shell is operator (55%), partnered with ExxonMobil (20%), Agip (12.5%), and TotalFinaElf (12.5%). The field will be serviced by a 2.0-million-bbl FPSO.

ExxonMobil is developing the 400-million-bbl Yoho field in the shallow waters of Block OML-104. ExxonMobil holds 40% and NNPC 60% of the \$1.2 billion project. First oil is planned for

early 2003, producing at 90,000 bbl/d. Yoho will utilize an FPSO to allow oil production almost two years ahead of the full-field production capacity. When full-field output of 150,000 bbl/d is achieved in late 2004, the FPSO will be replaced by a floating storage and offloading (FSO) vessel. Associated gas will be re-injected to maintain field pressures and eliminate flaring.

U.S.-based independent Kerr-McGee is currently exploring for oil offshore Benin. The wildcat well, Zifa-1 is expected to be completed in early 2003 on the eastern half of Block 4. Kerr-McGee holds 70% and is operator, with Malaysia's Petronas having the remaining 30% interest. A second well on the western half of the block, is likely before the end of 2003. Canada's Archean Energy Ltd holds a 100% interest on Benin's shallow-water Blocks 2 and 3. In neighboring Togo, Petronas and U.S.-independent Hunt Oil are planning to commence an exploration drilling program before the end of the first quarter of 2003. Hunt Oil signed a PSC with Togo in late July 2002 for the country's first deepwater well. Hunt Oil was awarded the exclusive right to Togo's entire offshore area last May. The contract area, previously divided into 15 blocks, covers 1,570 square miles (4,067 square kilometers).

Saltpond Offshore Producing Ltd (SOPL), which is 60% owned by U.S.-registered independent Lushann-Eternit and 40% by the state-owned Ghanaian National Petroleum Company (GNPC), has recently begun production on a very modest scale from the Saltpond oil and gas field offshore Ghana. Production from the Saltpond field was originally curtailed in 1985. Redevelopment of Saltpond may include the building a pipeline to take associated gas from the field to shore for domestic use, a spokesman from SOPL stated.

In March 2000, Scottish-based Dana Petroleum's WT-1X exploration well flowed at 1,000 bbl/d on Ghana's [West Tano Block](#). Dana Petroleum announced on October 18, 2002 that a second well on the West Tano Block had been successful. The WT-2X well was drilled to a total depth of 10,910 feet (3,300 meters) below sea level and encountered an oil-bearing reservoir, similar to that production-tested in the earlier WT-1X well. Several prospects in the deepwater portions of the Block, where the geology is different, are being evaluated with the intent of commencing deepwater drilling in late 2003.

It was announced in August 2002 that, Oklahoma-based Devon Energy and Canadian independent EnCana have entered into an agreement with the GNPC to explore for hydrocarbons offshore southeastern Ghana in the Keta Basin. The companies will invest \$56 million in seismic research and exploration drilling. Devon intends to test-drill on the Keta Block by mid-2003. Devon has been active in Ghana since 1997 when it acquired the Keta concession. An earlier wildcat well (Dolphin) in shallow waters on the Keta block proved dry in the first quarter of 2001. Houston-based Vanco Energy also signed an exploration agreement with the Ghanaian government in August 2002. Vanco Energy said it plans to invest \$30 million to explore for oil on the Cape Three Points Deepwater Block.

In June 2002, Calgary-based Canadian Natural Resources (CNR), signed a PSC for Cote d'Ivoire's CI-400 Block. Block CI-400 is located in deepwater of depths up to 6,600 feet (2,000 meters). CNR also holds interests in several other offshore blocks, including a 66% interest and the role of operator for Block CI-26, which contains the previously abandoned Espoir field. CNR's partners on CI-26 are Ireland's Tullow Oil (24%) and Cote d'Ivoire's state petroleum firm, Petroci (10%).

Re-development of the Espoir field, which was closed down in 1988 due to high production costs, has been estimated at \$265 million. The field includes two unmanned wellhead platforms with hydrocarbon processing on an FPSO. The FPSO has crude oil production capacity of 40,000 bbl/d and water injection capacity of 60,000 bbl/d. Espoir's oil production is exported by shuttle tanker,

while the natural gas is piped to shore where it is used to generate electricity. First production occurred in January 2002, and the field has a life expectancy of 20-25 years. Initial production began at 12,000 bbl/d of oil and 34 million cubic feet per day (Mmcf/d) of natural gas and is expected to peak at 28,000 bbl/d of oil and 35 Mmcf/d of natural gas. In March 2002, a new FPSO, *Espoir Ivoirien*, tested successfully and began production. The FPSO is contracted to produce for an initial ten-year term, with ten one-year renewal options after that. *Espoir's* recoverable reserves are estimated at 93 million barrels of oil and 180 billion cubic feet (Bcf) of gas.

In May 2003, the consortium partners announced results of the *Acajou South* oil discovery on Block CI-26, 5 miles (9 kilometers) southeast of the *Espoir* field. The well, approximately 15 miles (24 kilometers) off the coast of Cote d'Ivoire was drilled in waters with depth of 3,050 feet. It reached a total depth of 8,027 feet and encountered a gross oil column of over 250 feet. The well had test flows of 3,500 bbl/d of 33° API oil.

CNR operates Block CI-40 with a 61% interest, and is joined by Svenska Petroleum (29%) and Petroci (10%). In March 2001, CNR announced a discovery on Block CI-40, Cote d'Ivoire's first deepwater oil find. The *Baobab* discovery had a flow rate of 6,700 bbl/d of heavy (22°-23° API) oil and the well is expected to come online by 2005. A second successful well was completed in February 2002 and tested at a rate of 10,000 bbl/d. Block CI-40 lies 5 miles (8 kilometers) south of the *Espoir* field and is now estimated to have around 150 million barrels of recoverable oil reserves. CNR will test the *Kossipo* structure, which lies approximately 5 miles (8 kilometers) southeast of the similarly-structured *Baobab* find. The results from the *Kossipo* well will be used to determine the optimum development plan for the *Baobab* pool. First oil from the *Baobab* discovery could come online as soon as 2004 at rates of up to 95,000 bbl/d.

U.S.-based Ocean Energy (Ocean) operates the *Lion* and *Panthere* fields on Block CI-11. Current production from the block is 20,000 bbl/d of oil and nearly 70 mmcf/d of natural gas. Ocean's partners on Block CI-11 are Petroci, Pluspetrol of Argentina, and International Finance Corporation. Ocean has continued development work on Block CI-11 and is now extracting oil from the *Lion A5* deep-sea oil well. Recoverable reserves on Block CI-11 are estimated to be 210 million barrels of oil and 495 bcf of natural gas.

Although the Mano River States (Guinea, Liberia and Sierra Leone) currently produce no hydrocarbons, sporadic exploration activity is taking place. Houston's SCS Corp., a wholly owned subsidiary of HyperDynamics, and partner U.S. Oil Corp. have obtained exclusive rights to explore and market the results for the offshore area of Guinea. The venture has total exploration and data marketing rights to the entire continental margin of Guinea, which covers 210 miles of coastline and up to 150 miles offshore. Under the agreement with U.S. Oil, SCS will operate the exploration operations for an area of approximately 31,000 sq. miles. Phase one, an initial seismic survey, which commenced in April 2002, was budgeted at \$2.5 million. It was announced in July 2002, that the government of Sierra Leone was offering companies the chance to bid for leases on approximately 10,800 square miles (28,000 square kilometers) of offshore area to develop the country's petroleum reserves. The concession areas are being split into seven blocks of approximately 1,550 square miles (4,000 square kilometers) each, and bids on the concessions were originally due by the end of March 2003. Oil companies interested in the offshore acreage petitioned the government to extend the deadline so that they could have more time to evaluate seismic data. The blocks are likely to be awarded by the end of 2003. Several test wells drilled in the 1970's on Sierra Leone's continental shelf produced "shows" of oil.

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, it was reported that Premier Oil plans to retain its acreage in Guinea-Bissau, and is in the process of reviewing seismic data on its holdings. Premier Oil intends to drill two exploration wells on its Guinea-Bissau acreage during the second half of 2003. In August 2002, the national oil company of Guinea-Bissau, Petroguin, was near completing the arrangements 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.

In June 2002, U.S.-independent Amerada Hess (Hess) announced it had acquired a 68% interest in the Croix du Sud Block. Croix du Sud is located in jointly-administered waters offshore Guinea-Bissau and Senegal. In 1995 Guinea-Bissau and Senegal established the Agence de Gestion et de Cooperation (AGC) for the joint-development of maritime resources located in the area. Hess' partners on the block are the AGC (12% interest) and Australia's Fusion Oil (20%). Fusion Oil also holds a 10% interest in the AGC-administered Cheval Marin Block. Agip (75% and operator) and the AGC (15%) are Fusion Oil's partners on Cheval Marin. Seismic surveys were completed on Cheval Marin in April 2002, and additional seismic surveys are planned for both AGC blocks. In 1960, the French-firm Total (now TotalFinaElf) discovered the Dome Flore field, which contains estimated reserves of 700 million barrels of heavy crude, in waters now-administered by the AGC.

Houston-based Vanco Energy Company (Vanco) signed a PSC with the government of Senegal in October 1999. The PSC is for the Dakar Offshore Profond permit, a 7.9-million acre (32,000 sq km), deepwater block that extends from Senegal's offshore boundary with Gambia to the Mauritanian border. The license is the largest concession to date in offshore Senegal, and the country's first deepwater award. Vanco is operator of the concession with a 90% interest and Senegal's state-owned oil company, Petrosen, holds the remaining 10%. Seismic surveys on the block were conducted in 2000 and 2001, and Vanco plans to drill an exploratory well on the southern portion of the block by the end of 2003.

Two Australian independents, Roc Oil and Woodside Petroleum (Woodside), have decided to let the PSCs on Senegal's Casamance Blocks I, II, and III lapse in December 2002. In its announcement, Roc Oil said the decision was reached after reprocessing seismic data and carrying out seismic survey during the past three years. The blocks, located offshore southern Senegal, cover a total area of 2 million acres (8,187 square kilometers).

Hess (80% interest) and Fusion Oil (20%) hold the rights to Gambia's Deepwater PPL Block. The license has been issued for six years during which time an extensive exploration campaign involving seismic acquisition and the drilling of two wells will be undertaken. In December 1999, a 2D seismic survey over the western half of the Gambian licence was conducted, and in February 2001 a second 2D seismic survey was completed. The companies are currently finalizing interpretation studies and have been evaluating options for 3D seismic data acquisition in 2003.

There is currently little hydrocarbon exploration activities in the landlocked countries of Mali, Niger, and Burkina Faso. Mali plans to offer 15 blocks in four basins, with the final awards being granted before the end of 2003. [Algeria](#), through its state-owned oil firm Sonatrach, has already inked an exploration pact with Mali to jointly explore the Taoudeni basin. Taoudeni extends across the borders of both countries. In November 2002, Niger's Mining and Energy Minister stated that a consortium consisting of ExxonMobil and Petronas, will begin drilling three exploratory oil wells in the Agadem Basin (in eastern Niger) starting in April 2003. Previous exploration in the Agadem Basin had confirmed reserves of 300 million barrels, but the oil was not exploited because the reserves were not considered commercially viable. 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.

Several finds have been made **offshore** non-ECOWAS member Mauritania. A consortium of firms, led by Woodside, made the Chinguetti discovery in May 2001 on Block 4. Studies indicate the most likely recoverable reserves on the Chinguetti field are in excess of 100 million barrels. Woodside and its consortium partners signed PSCs for three Areas (A, B and C) covering exploration blocks 2-6. Woodside is the operator and its partners include: Agip, Roc Oil, Fusion Oil and Hardman Resources (Hardman). Participants in PSC Block A are Woodside (35% and operator), Agip (35%), Hardman (24.3%), Fusion Oil (3.0%), and Roc Oil (2.7%). On PSC Block B, Woodside and Agip each hold 35%, Hardman 21.6%, Fusion 6.0%, and Roc Oil 2.4%. In February 2002, South Africa's Energy Africa acquired a 20% stake in Block 2 off the coast of Mauritania. Energy Africa bought the interest from Woodside, Hardman Resources and Roc Oil. Participating partner's interests in Block 2 are: Woodside (operator) 48%, Hardman 28.8%, Energy Africa 20% and Roc Oil 3.2%. In May 2003, Premier Oil announced that it had reached an agreement with Fusion Oil to acquire its interest in the Mauritanian PSCs for a cash consideration of \$10 million and an overriding royalty. As part of this transaction, Premier Oil has granted Fusion Oil the right to receive a 5% interest from Premier Oil's 100% interest in Block 2 and in Blocks 4A and 5A in Guinea Bissau, with these rights to be exercised within 60 days of completion of the drilling of the next well on each block.

The consortium partners planned an extensive drilling program to evaluate and delineate the Chinguetti discovery. The Chinguetti 4-2 appraisal well was the first of five proposed test wells scheduled for 2002. Other wells to be drilled were: the Banda (Chinguetti 4-3) exploration well, the Chinguetti 4-4 exploration well (PSC Area A), the Thon prospect (PSC Area C) and the Tiof exploration prospect on PSC Area B. It was reported in September 2002, that the Chinguetti 4-2 well flowed at an initial rate of 1,560 bbl/d of oil and 650,000 cubic feet per day of natural gas. In October 2002, results from the Banda well were announced. The well drilled offshore Mauritania by the Woodside consortium intersected an oil column and a gas column, but it was not flow-tested. An appraisal well may be drilled early in 2003. Woodside reported on October 11, 2002 that the Chinguetti 4-4 appraisal well had been plugged and abandoned. In November 2002, the Thon well was plugged and abandoned as a dry hole. Earlier in November 2002, Petronas acquired a 35% interest in PSC Area C. Woodside remains the operator, but reduces its interest from 59.5% to 37.6%, and Hardman cut its stake from 35.5% to 22.4%. Roc Oil's share remains at 5.0%. Drilling on the Tiof prospect was pushed to 2003. Up to five wells will be drilled in PSC Areas A and B during 2003. These include two exploration wells and three contingent wells (including two Banda appraisal wells).

Exploration activities on other blocks offshore Mauritania are taking place. A consortium led by Dana Petroleum is currently acquiring seismic data on Block 1. In September 2002, Energy Africa acquired an interest in Block 1. Participating interests in Block 1 following the acquisition are: Dana Petroleum (Operator) 48%, Energy Africa 32%, Hardman 18% and Roc Oil 2%. Drilling activity on Block 1 is tentatively scheduled to begin in late 2003 or early 2004. Seismic data is also being gathered on two other Dana-operated blocks, 7 & 8. Dana Petroleum's (51.4%) partners on Block 7 are: Woodside (35%), Hardman (11.6%) and Roc Oil (2%). On Block 8, Dana Petroleum (80%) is partnered with Hardman (18%) and Roc Oil (2%). The Mauritanian Ministry of Mines and Industry, has opened discussions with companies about entering into PSCs on five ultra-deep water blocks. The Blocks 13-17, lie west of Chinguetti and Banda discoveries.

### **Refining**

West Africa's petroleum refining capacity is concentrated in Nigeria. Nigeria's four refineries have the capacity to process 438,750 bbl/d of crude. Other ECOWAS refineries are in Cote 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).

Nigeria refinery problems including sabotage, fire, poor management and lack of turnaround maintenance (TAM) have decreased output, and forced the nation to often import refined petroleum products to meet demand. In January 2003, The NNPC announced plans to undertake TAM at the country's four refineries, but gave no schedule of when the work was likely to be completed.

The capacity of Ghana's Tema Oil Refinery (TOR) was increased from 25,000 bbl/d to 45,000 bbl/d in 1997, when it underwent a major modernization program at a cost of \$208 million. TORC is heavily in debt, as a result of its providing subsidized petroleum products during times of high crude prices. In November 2002, a residual catalytic cracking (RCC) unit was commissioned at TOR. The RCC unit will treat 14,000 bbl/d of resid from TOR's distillation unit to extract more gasoline and diesel fuel after the first stage of refining. The RCC would also allow TOR to produce surplus LPG and gasoline for export.

Cote d'Ivoire's SIR is scheduled to be almost fully privatized by the end of 2003, after several long delays due to political turmoil. The state currently owns approximately 48% of SIR, and expects to retain a 10% interest after privatization. Other shareholders in SIR are: TotalFinaElf (25%), Shell (10%), ExxonMobil (8%), the government of Burkina Faso (5%), and ChevronTexaco (4%).

The Nigerian government is seeking investors to purchase its 48% stake in Sierra Leone's West African Refinery Company (WARC). Nigeria's privatization agency, Bureau for Public Enterprises, stated that potential bidders must provide proof of their ability to operate and manage the refinery. WARC was acquired by the government of Sani Abacha in 1994. Unipetrol, a Nigerian oil marketing company also holds a 24.2% interest in WARC.

### **Consumption**

Petroleum consumption in West Africa averaged 470,170 bbl/d in 2002. The overwhelmingly vast majority of petroleum consumed in the region is imported; Nigeria is the only net exporter of petroleum.

In January 2003, the Ghanaian government announced fuel price hikes that would bring them in line with world markets and to help pay off TOR's massive debt. Energy Minister Albert Kan Dapaah stated that premium gasoline, which used to sell at 10,500 cedis (\$1.27) per gallon, will now cost 20,000 cedis (\$2.43), and diesel will sell at 17,500 cedis (\$2.12), up from 8,800 cedis (\$1.07). Minister Kan Dapaah also said the increases will help deter fuel smuggling between Ghana and neighboring countries where prices are much higher. A similar price increase, initiated in May 2001, saw the price of gasoline rise by nearly 8% in Burkina Faso.

Several countries in the region have recently experienced periodic, sometimes severe, petroleum shortages. Limited fuel storage capacity and a lack of foreign exchange have contributed to Gambia's fuel shortages. The situation was exacerbated by the implementation of fuel rationing and a lack of imports arriving from Cote d'Ivoire, due to the political instability.

In September 2002, the coup attempt in Cote d'Ivoire created acute shortages of gasoline and diesel fuel in portions of the country. Deliveries to interior regions of the country were halted due to fears that fuel trucks might be hijacked by rebel forces.

A strike by tanker drivers caused a fuel shortage in Ghana in May 2003. The strike, apparently in



protest of the arrest of some drivers for illegally dealing in petroleum products, caused temporary shortages at petrol stations throughout the country.

## NATURAL GAS

There are significant reserves of natural gas in West Africa. Field discoveries have been confirmed and reserves have been proven in Benin (43 Bcf); Cote d'Ivoire (1.1 trillion cubic feet--Tcf); Ghana (840 Bcf); Nigeria (124.0 Tcf); and Senegal(106 Bcf) (see [Table 4](#)). West Africa contains approximately 32% of Africa's natural gas reserves. Although natural gas is still in early stages of use in the region, several projects for the expansion of its use are under way.

Nigeria's reserves are the 9th largest in the world, but due to a lack of infrastructure, Nigeria flares 75% of the natural gas it produces. Nigeria is developing several projects to utilize its vast reserves of associated and non-associated natural gas. Nigeria's most ambitious natural gas project, the \$3.8-billion LNG (liquefied natural gas) facility on Bonny Island, was completed in September 1999. Initially, the facility is to be supplied from dedicated natural gas fields, but within a few years it is anticipated that half of the input gas will consist of associated (currently flared) natural gas. The consortium developing the project, Nigeria Liquefied Natural Gas Corporation (NLNG), is comprised of the NNPC (49%), Shell (25.6%), TotalFinaElf (15%), and Agip (10.4%). In December 2002, NLNG commissioned the third LNG train and shipped the first cargo from the new facility. NLNG is in the process of constructing trains four and five and they should be on stream in 2005. A sixth LNG train is being considered.

In August 2002, Ghana signed production agreements with Britain's First Oil for the development of its Tano (North and South) offshore oil and natural gas fields. Gas from the fields is to power turbines mounted on barges in the Effasu Lagoon. North Tano is to be developed first, supplying 26 Mmcf/d to Effasu by the end of 2003, where a gas processing plant will be built adjacent to the 134-megawatt (MW) power-generation barge. South Tano is farther offshore, in deeper water, and it will come on stream later. When on stream, gas deliveries will rise to 60 Mmcf/d and generating capacity at Effasu/Mangyea can be increased to 270 MW. The South Tano field should also boost oil production from both fields to 3,000 bbl/d.

Natural gas reserves in Cote d'Ivoire, first discovered in the 1980's, have begun to be developed and utilized. Over the next four years, the Ivorian government estimates that natural gas consumption will grow by 50%. Initial production of 34 Mmcf/d of natural gas from the re-developed Espoir field began in January 2002. Espoir's recoverable reserves are estimated at 180 bcf of natural gas.

Senegal's natural gas reserves are primarily located onshore. In October 2002, U.S.-independent Fortesa has begun natural gas production from the onshore Gadiaga Development Area and is applying for a license for the adjoining Kayar offshore field. Gadiaga currently produces two mmmcf/d and Fortesa executives stated that the company planned to carry out additional seismic studies. Fortesa holds a 70% stake in Gadiaga, with the remaining 30% held by Petrosen, the Senegalese national oil company. Production from the onshore Diam Niadio field, which took place from 1986 to 1999, totaled more than 7 bcf.

The most significant natural gas development project being considered is the [West African Gas Pipeline \(WAGP\)](#) project. The WAGP will traverse 620 miles (1,033 kilometers) both on and offshore from Nigeria's Niger Delta region to its final planned terminus in Ghana. The \$500 million WAGP will initially transport 120 Mmcf/d of gas to Ghana, Benin and Togo beginning in June 2005. Gas deliveries are expected to increase to 150 Mmcf/d in 2007, to 210 MMcf/d in 7 years and be at 400 Mmcf/d when the pipeline is functioning at its capacity (approximately 15 years after construction). Speculation has the WAGP eventually terminating in Senegal, but the current

regional stability problems of several countries (Cote d'Ivoire, Liberia, Sierra Leone) that lie on the way to Senegal, will hinder any further extension of the WAGP.

In February 2003, the four nations signed an agreement on the implementation of the WAGP. 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%, NNPC with 25%, Shell with 18%, Ghana's Volta River Authority (VRA) with 16.3% and Societe Beninoise de Gas and Societe Togolaise de Gas each with a 2% interest.

## **ELECTRICITY**

West Africa's total installed electric generating capacity was 9.4 gigawatts (GW) at the beginning of 2001, the majority of which is thermal (see [Table 5](#)). Total electricity generation for the region in 2001 was 33.8 billion kilowatthours (bkwh) , with Nigeria (15.7 bkwh), Ghana (8.8 bkwh) and Cote d'Ivoire (4.6 bkwh) being the largest generators. In 2001, total regional electricity consumption was 31.8 bkwh, led by Nigeria's 14.6 bkwh (45.8%). Ghana (8.8 bkwh, 27.8%), Cote d'Ivoire (3.0 bkwh, 9.4%) and Senegal (1.4 bkwh, 4.4%) were the next largest electricity consumers.

A tender for the privatization of Benin's water and electricity utility, Societe Beninoise d'Electricite et de l'Eau (SBEE) is expected before the end of 2003. Plans call for SBEE to separate its water and electricity operations into two separate companies. As part of the privatization, Benin plans to create an agency for rural electrification that would bring power to areas where it was not economically feasible to extend SBEE's grid.

Hydroelectricity is the primary source of Ghana's power. Ghana's current hydroelectric capacity of 1.072 GW is located at Akosombo (912 MW) and Kpong (160 MW). The Ghanaian government is considering additional hydroelectric projects to be built on a Build Operate Transfer (BOT) financing scheme. The \$700-million, Bui hydroelectric project would be located on the Black Volta. The Bui project would 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 Cote d'Ivoire. A second BOT facility, located on the Pra River, would have a total generating capacity of 125 MW. Recent low rainfall has forced power cuts from Ghana's hydroelectric facilities, similar to the power shortages experienced in 1997/1998.

Ghana plans to reduce its reliance on hydroelectric power by increasing and expanding thermal generating capacity. Current thermal facilities are located at Tema and Takoradi. Additional capacity is planned at Tano (gas-fired barges) and at Tema. 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 VRA is currently in the process of installing 110 MW at the Strategic Reserve Plant (SRP), near the Electricity Company of Ghana (ECG) main substation in Tema. In April 2003, U.S.-based CMS Energy announced that it is planning a \$100 million expansion of its thermal power plant at Takoradi. The upgrade would convert the plant from burning crude oil to natural gas which it would receive from Nigeria through the WAGP. CMS Energy has a 90% stake in the Takoradi facility, and the VRA holds the remaining 10%. 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.

A large portion of the Liberia Electricity Corporation's (LEC) generation and distribution infrastructure was damaged or destroyed during the civil war. LEC estimates that it will cost more

than \$107 million and take over five years to repair the entire electricity generation and distribution system

Sierra Leone's Bumbuna hydroelectric project was nearly complete (85%) when civil war disrupted the construction. The government hopes to restart construction in early 2003, but funding is an issue. The cost of completing the project is estimated at \$40.2 million, and the African Development Bank (AfDB) has pledged to provide \$8.7 million. Sources for the remaining \$31.5 million have yet to be identified.

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% 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 (100 km) downstream at Kaleta.

Senegal's Societe Nationale d'Electricite (SENELEC) handles the generation, transmission and distribution of the majority of the country's electricity. The government's ownership in SENELEC was reduced to a 41% share in March 1999, when a consortium comprised of the utilities Hydro-Quebec of Canada and Elyo of France acquired a 34% interest in SENELEC. In 2000, a series of power cuts prompted the government to take back the stake sold to the Franco-Canadian venture. Privatization negotiations with France's Vivendi fell through in February 2001, and government negotiations with U.S.-utility AES Corp ended unsuccessfully in July 2002.

Gambia's National Water and Electricity Company (NAWEC) signed an agreement with South Africa's Eskom in June 2000. Eskom was to acquire a 50% stake in NAWEC and participate in a \$75-million investment program to overhaul NAWEC generating plants over the next five years. The agreement, which was to include financing from the World Bank, fell through three months later. In December 2000 the AfDB awarded a \$3.8-million loan to finance a rural electrification project in The Gambia. The project consists of construction of six power stations (combined capacity of 6.2 MW), the installation of 141 miles (227 km) of transmission and distribution lines to supply power to 46 towns and villages. The total cost of the rural electrification project is estimated at \$19 million, with the additional financing coming from international donors.

Niger is seeking international and multilateral donors to help in the construction of the Kandadji hydroelectric project. Kandadji, first conceived in the mid-1970's, would be located on the Niger River approximately 120 miles (200 km) upstream of Niamey. The 165-MW facility (originally proposed to be 230 MW) is expected to cost \$270 million. The government of Niger hopes to begin construction in 2004 and complete it by 2012. Smaller dams on the Niger River at Gambou (122 MW) and Dyodyonga (26 MW) have been considered.

### **Regional Projects**

In October 2000, 14 ECOWAS members signed an agreement to launch a project to boost power supply in the region. The West African Power Pool (WAPP) agreement reaffirmed the decision to develop energy production facilities and interconnect their respective electricity grids. According to the agreement, the WAPP will be accomplished in two phases but is planned to be fully implemented by 2005. The first phase involves countries that are already interconnected, including Nigeria, Benin, Burkina Faso, Cote d'Ivoire, Ghana, Niger and Togo. The second phase involves countries which are yet to have interconnection facilities, which include Guinea, Guinea-Bissau, Liberia, Mali, Senegal, Gambia and Cape Verde. Under the agreement, WAPP is expected to harmonize the regulatory framework that governs the electricity sector in each member country. Nigeria and the AfDB signed a \$15.6 million loan agreement in December 2002 for the

interconnection of NEPA (Nigerian Electric Power Authority) and Compagnie Electrique du Benin (CEB) networks. CEB is the electricity transmission company for Benin and Togo.

The Organization for the Development of the Senegal River (OMVS), which consists of Mali, Mauritania and Senegal, has constructed two dams. The Diama dam, located in Senegal, was completed in 1986 and its primary function is to stop the upstream encroachment of seawater from the Atlantic Ocean. The Manatali dam, built by the OMVS on the Bafing River, the main tributary of the Senegal River, in Mali, was completed in 1987. The Manatali project was also to include a 200-MW power station and an 800-mile (1,300-km) 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, AfDB 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 hydro-electric 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.

The AfDB has also issued a \$2.13 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 study aims to strengthen regional integration of OMVG member states in the energy sector, particularly in the electricity sub-sector. A feasibility study of the Sambangalou hydroelectric project on the Gambia River, and the interconnection network project linking the facility to the distribution networks of the four countries will be conducted.

Growing demands for power have prompted Burkina Faso to seek import electricity from neighboring Cote d'Ivoire. A 225-kilovolt (KV) power line, connecting the city of Ferkessedougou in northern Cote d'Ivoire with the Burkinabe capital, Ouagadougou, is expected to begin operations in 2005. Burkina Faso employs diesel generators to produce electricity, but high production costs attributed to fluctuating oil prices prompted the government to begin interconnecting Burkina Faso's grid with that of neighboring countries like Ghana and Cote d'Ivoire to import additional electricity requirements.

Work began in early 2003 on a project to connect portions of Niger to Nigeria's electricity grid. The project involves the construction of three separate networks at an estimated cost of \$16 million. The imported power will be much cheaper than the domestically oil-generated electricity currently consumed, and the project will help eliminate several diesel-powered generators.

*Sources for this report include: Africa Energy and Mining; Africa News Service; CIA World Factbook 2002; Dow Jones; Economist Intelligence Unit ViewsWire; Factiva; Global Insight; International Monetary Fund; Oil and Gas Journal; Petroleum Intelligence Weekly; Panafrican News Agency; Reuters; U.S. Energy Information Administration; World Bank*

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<b>Table 1. Economic and Demographic Indicators</b>
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Country	Gross Domestic Product (GDP), 2001E (Billions of U.S. \$)	Real GDP Growth Rate, 2001 Estimate	Real GDP Growth Rate, 2002 Estimate	Per Capita GDP, 2001E	Population 2002E (Millions)
Benin	\$2.4	4.9%	4.8%	\$366	6.8
Burkina Faso	\$2.4	5.1%	5.2%	\$205	12.6
Cape Verde	\$0.6	2.8%	3.4%	\$1,251	0.4
Cote d'Ivoire	\$9.2	-0.9%	3.5%	\$562	16.8
Gambia	\$0.4	5.0%	4.1%	\$275	1.5
Ghana	\$5.3	3.9%	5.1%	\$269	20.2
Guinea	\$2.9	2.9%	2.4%	\$380	7.8
Guinea-Bissau	\$0.2	7.2%	6.2%	\$186	1.3
Liberia	\$0.5	5.3%	4.2%	\$188	3.3
Mali	\$2.6	1.5%	7.9%	\$237	11.3
Mauritania	\$0.9	4.3%	3.7%	\$344	2.8
Niger	\$1.6	4.6%	2.9%	\$139	10.6
Nigeria	\$39.5	3.9%	3.3%	\$302	129.9
Senegal	\$4.6	5.7%	4.9%	\$472	10.6
Sierra Leone	\$0.7	5.5%	5.2%	\$146	5.6
Togo	\$1.3	2.2%	2.0%	\$274	5.3
<b>Regional Total/Average</b>	<b>\$75.1</b>	<b>3.4%</b>	<b>3.8%</b>	<b>\$304</b>	<b>246.8</b>

Sources: Global Insight; Central Intelligence Agency World Factbook 2002; International Monetary Fund

**Table 2. Total Energy and Carbon Dioxide Emissions, 2001**

Country	Total Energy Consumption, (Quadrillion Btu)	Total Energy Production, (Quadrillion Btu)	Net Energy Exports, (Quadrillion Btu)	Carbon Dioxide Emissions (Million metric tons of carbon)
Benin	0.030	0.004	-0.009	0.45
Burkina Faso	0.018	0.001	-0.010	0.31
Cape Verde	0.004	0.000	-0.002	0.06
Cote d'Ivoire	0.120	0.083	-0.025	1.92
Gambia	0.004	0.000	-0.003	0.08
Ghana	0.171	0.058	-0.050	1.48
Guinea	0.023	0.004	-0.017	0.37
Guinea-				

Bissau	0.005	0.000	-0.004	0.10
Liberia	0.007	0.000	-0.006	0.13
Mali	0.011	0.003	-0.008	0.16
Mauritania	0.050	0.000	-0.048	0.89
Niger	0.015	0.004	-0.012	0.30
Nigeria	0.916	5.136	4.305	23.52
Senegal	0.066	0.001	-0.063	1.25
Sierra Leone	0.014	0.086	-0.010	0.26
Togo	0.026	0.000	-0.019	0.40
<b>Regional Total</b>	<b>1.480</b>	<b>5.294</b>	<b>4.016</b>	<b>31.68</b>

Sources: Energy Information Administration

<b>Country</b>	<b>Petroleum Production, 2002 (Thousand Barrels Per Day)</b>	<b>Petroleum Consumption, 2002 (Thousand Barrels Per Day)</b>	<b>Petroleum Net Exports, 2002 (Thousand Barrels Per Day)</b>	<b>Crude Oil Reserves, 1/1/2003 (Million Barrels)</b>	<b>Crude Oil Refining Capacity, 1/1/2003 (Thousand Barrels Per Day)</b>
Benin	1.00	13.05	-12.05	8.2	0.0
Burkina Faso	0.00	8.87	-8.87	0.0	0.0
Cape Verde	0.00	2.34	-2.34	0.0	0.0
Cote d'Ivoire	19.39	32.0	-12.61	100.0	65.2
Gambia	0.00	1.98	-1.98	0.0	0.0
Ghana	7.00	40.49	-33.49	16.2	45.0
Guinea	0.00	8.73	-8.73	0.0	0.0
Guinea-Bissau	0.00	2.59	-2.59	0.0	0.0
Liberia	0.00	3.20	-3.20	0.0	15.0
Mali	0.00	4.07	-4.07	0.0	0.0
Mauritania	0.00	24.13	-24.13	200.0	0.0
Niger	0.00	5.03	-5.03	300.0	0.0
Nigeria	2,122.86	272.96	1,849.90	31,506.0	438.8
Senegal	0.00	32.20	-32.20	700.0	27.0
Sierra Leone	0.00	6.66	-6.66	0.0	10.0
Togo	0.00	11.87	-11.87	0.0	0.0
<b>Regional</b>					

<b>Total/Average</b>	<b>2150.25</b>	<b>470.17</b>	<b>1,680.07</b>	<b>32,830.4</b>	<b>601.0</b>
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Sources: Energy Information Administration, Oil & Gas Journal, OPEC Statistical Bulletin, Government of Mauritania, Agence de Gestion et de Cooperation, Government of Niger

<b>Table 4. Natural Gas Overview (Billion Cubic Feet)</b>			
<b>Country</b>	<b>Production, 2001</b>	<b>Consumption, 2001</b>	<b>Reserves, 1/1/2003</b>
Benin	0.00	0.00	43
Burkina Faso	0.00	0.00	0
Cape Verde	0.00	0.00	0
Cote d'Ivoire	47.68	47.68	1,050
Gambia	0.00	0.00	0
Ghana	0.00	0.00	840
Guinea	0.00	0.00	0
Guinea-Bissau	0.00	0.00	0
Liberia	0.00	0.00	0
Mali	0.00	0.00	0
Mauritania	0.00	0.00	0
Niger	0.00	0.00	0
Nigeria	553.74	277.22	124,000
Senegal	1.77	1.77	106
Sierra Leone	0.00	0.00	0
Togo	0.00	0.00	0
<b>Regional Total</b>	<b>603.18</b>	<b>326.67</b>	<b>126,039</b>

Sources: Energy Information Administration; Oil and Gas Journal

<b>Table 5. Electricity Overview, Billion Kilowatthours except where noted</b>					
<b>Country</b>	<b>Consumption, 2001</b>	<b>Generation, 2001</b>	<b>Installed Capacity, 1/1/2001 (gigawatts)</b>	<b>Thermal Capacity (% of total)</b>	<b>Hydroelectric Capacity (% of total)</b>
Benin	0.63	0.27	0.094	28.7%	71.3%
Burkina Faso	0.26	0.28	0.121	73.6%	26.4%
Cape Verde	0.04	0.04	0.007	100.0%	0.0%
Cote d'Ivoire	2.98	4.61	0.892	31.2%	68.8%
Gambia	0.08	0.09	0.029	100.0%	0.0%

Ghana	8.84	8.80	1.200	10.7%	89.3%
Guinea	0.74	0.79	0.195	73.3%	26.7%
Guinea-Bissau	0.05	0.06	0.011	100.0%	0.0%
Liberia	0.44	0.47	0.330	100.0%	0.0%
Mali	0.45	0.48	0.114	56.1%	43.9%
Mauritania	0.15	0.16	0.105	41.9%	58.1%
Niger	0.33	0.24	0.063	100.0%	0.0%
Nigeria	14.56	15.67	5.888	67.1%	32.9%
Senegal	1.41	1.52	0.235	100.0%	0.0%
Sierra Leone	0.23	0.25	0.128	96.9%	3.1%
Togo	0.61	0.10	0.034	88.2%	11.8%
<b>Regional Total</b>	<b>31.78</b>	<b>33.82</b>	<b>9.446</b>	<b>58.8%</b>	<b>41.2%</b>

Sources: Energy Information Administration

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