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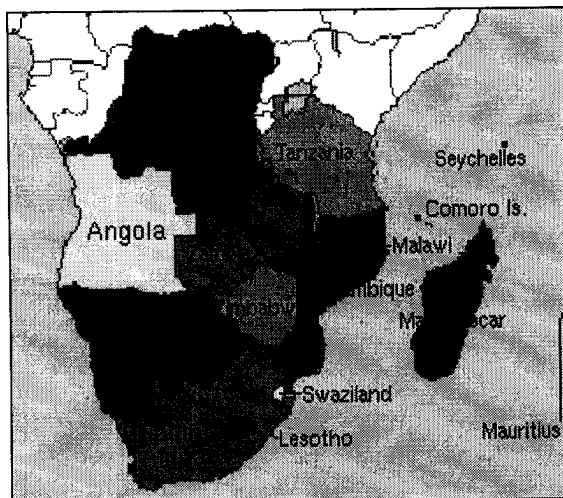
July 2005

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# The Southern African Development Community

*The following provides a brief economic and energy sector of the fourteen countries that make up the Southern African Development Community (SADC): Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar (membership pending), Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. Overviews of non-SADC members Comoros and Seychelles are also included.*

*Note: The information contained in this report is the best available as of July 2005.*



## BACKGROUND

The Declaration and Treaty establishing the Southern African Development Community (SADC) was signed on July 17, 1992, in Windhoek, Namibia. South Africa joined SADC in 1994 followed by Mauritius (1995), the Democratic Republic of Congo -- DRC (1997), and Seychelles (1997). The Seychelles subsequently pulled out of the SADC in 2004. Uganda's application for membership in SADC, submitted in the fall of 2000, currently is awaiting SADC approval. In August 2004, Madagascar was granted candidate membership status, which may be upgraded to full membership in August 2005.

Seychelles, Comoros and Madagascar, with SADC-members Angola, DRC, Malawi, Mauritius, Namibia, Swaziland, Zambia and Zimbabwe, are members of the Common Market for Eastern and Southern Africa (COMESA).

Mauritius' Prime Minister, Paul Raymond Berenger, is the current SADC Chairman. SADC objectives include regional economic integration, poverty alleviation, harmonization and rationalization of policies, and strategies for sustainable development in all areas. The SADC Trade Protocol calls for an 85 percent reduction of internal trade barriers. Within the SADC region, the national currencies of Namibia, Lesotho, and Swaziland are linked to the South African rand through the Common Monetary Area (CMA). SADC members are working to eliminate exchange controls in preparation for an eventual single currency in the region.

In March 2004, the SADC executive secretary announced a strategic plan that sets out a time frame for the economic integration of the region. Some of the outlined measures include: the creation of a free trade area by 2008; establishment of a SADC customs union and implementation of a common external tariff by 2010; establishment of a SADC central bank and preparation for a single SADC currency by 2016; creation of a SADC regional development fund and self-financing mechanism by 2005; and a common market pact by 2012.

## ECONOMIC OVERVIEW

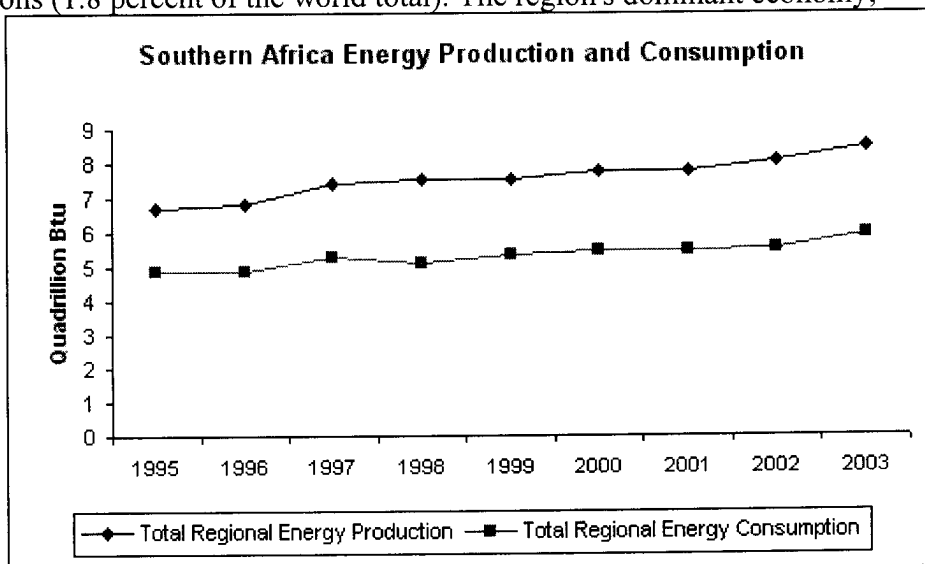
In 2004, the combined Gross Domestic Product (GDP) for Southern Africa was approximately \$296.4 billion (see Table 1). Individual national economies are structurally diverse and at varying stages of development. South Africa, the region's most developed economy, has a GDP of \$213.1 billion, which is more than double the combined GDP of the other Southern African countries. Challenges of post-war disarmament and reconstruction (in Angola and DRC), and continuing internal strife (Zimbabwe) have adversely affected economic performance in these states. The Zimbabwean economy has experienced a sharp deterioration over the past five years, with real GDP contracting by about 30 percent during that period and inflation reaching 600 percent in 2003, before dropping to 124 percent in 2005. The economies of DRC and Angola have begun to experience GDP growth as peace agreements in both countries begin to take hold.

On January 1, 2004, Angola became the 37th sub-Saharan African country eligible for tariff preferences under the African Growth and Opportunity Act (AGOA). This distinction is awarded to countries that have made 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. In Southern Africa, only Comoros and Zimbabwe are not covered by AGOA.

## ENERGY OVERVIEW

Overall, Southern Africa is a net energy exporter. In 2003, the countries of Southern Africa collectively consumed (see Table 2) 5.9 quadrillion British thermal units (Btu) of commercial energy (1.4 percent of total world consumption) and produced 8.5 quadrillion Btu (2.0 percent of total world production). Also in 2003, the region generated 126.33 million metric tons of carbon dioxide emissions (1.8 percent of the world total). The region's dominant economy,

South Africa, accounted for 83.1 percent (4.9 quadrillion Btu) of the region's energy consumption, 69.4 percent (5.9 quadrillion Btu) of its energy production, and 88.8 percent (112 million metric tons) of its carbon dioxide emissions.



Throughout the region, there are significant reserves of coal, petroleum, and natural gas. Electricity in Southern Africa is generated mainly through thermal or hydroelectric resources (with one nuclear facility in South Africa). Natural gas is becoming more significant to the region's energy sector as fields off Mozambique, Namibia, South Africa and Tanzania are developed. Due to the region's relatively small urban population (approximately 25.4 percent), access to commercial energy sources is limited. The majority of Southern Africa's population still relies on the use of biofuel (wood and charcoal) as its primary source of energy.

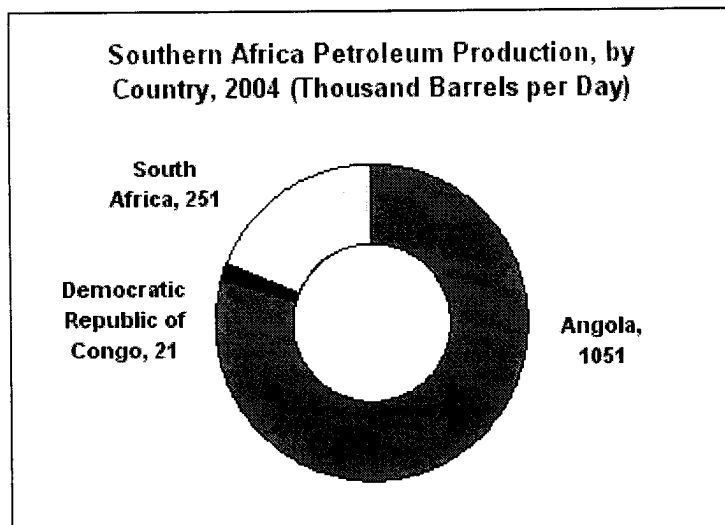
## PETROLEUM

Angola, Southern Africa's only significant oil producer, produced an average of 1.05 million barrels per day (bbl/d) in 2004 (see Table 3). Angola's estimated reserves of 5.4 billion barrels constitute 96 percent of the region's estimated proven crude reserves. Smaller reserves are found offshore DRC and South Africa. The region's refineries are concentrated in South Africa,

with additional refining capacity located in Angola, Madagascar, Tanzania and Zambia. South Africa is the region's largest oil consumer (over 68 percent of the region's total), and the second largest oil consumer in Africa after Egypt.

### Exploration and Production

Crude oil production in Angola has quadrupled over the past twenty years. One of the largest production areas is Block Zero, located offshore of the Cabinda province. In January 2005, ChevronTexaco announced the first production from Block Zero's Bomboco field, while the Sanha field is expected to begin production in 2005. Chevron's Benguela, Belize, Tomboco and Lobito fields on Block 14 are expected to come onstream in 2007. Block 15's \$3.4 billion Kizomba A field, operated by ExxonMobil, began production in August 2004. It is targeted to have a peak production of 250,000 bbl/d. First oil from the Kizomba B field is expected in late 2005, while the Kizomba C field is still in the planning stage. On offshore Block 17, oil is produced from the Girassol and Jasmin fields. A third field, Dalia, with expected output of close to 200,000 bbl/d, will likely begin production in late 2006. First oil from the Greater Plutonio project on Block 18, operated by BP, is likely in late 2005. It is expected to have a production capacity of 250,000 bbl/d. In 2004, China National Petroleum Corp. (CNPC) gained Shell's 50 percent stake in Block 18, after Angola's national oil company, Sonangol, vetoed the bid of India's National Oil and Gas Corporation. In 2005, BP, in partnership with ExxonMobil, Statoil, and Marathon Oil, announced the fifth and sixth oil discoveries on Block 31, located at the Palas-1 and Ceres-1 wells, respectively.



South Africa's oil production meets 10 percent of its domestic needs. PetroSA, South Africa's national oil company, has concentrated its exploration efforts on South Africa's western and southern coasts. Several discoveries have been made in the Bredasdorp Basin on Block 9, including the Oribi, Oryx and Sable fields. The Oribi field, South Africa's first oil field, began production in May 1997; however, its reserves are expected to be depleted soon. The Oryx field began production in May 2000 and currently produces 12,000

bbl/d. In late 2003, production at the Sable field began at 40,000 bbl/d.

In June 2005, South African petrochemical company Sasol and the Mozambican National Hydrocarbon Company (ENH) signed an agreement with the Mozambican government for blocks 16 and 19, east of the Panmde and Temane fields, off the southern coast of Mozambique. The seismic studies and drilling are expected to cost \$7 million. In February 2005, Mozambique launched its second offshore licensing round for blocks in the northern Rovuma offshore basin. As of June 2005, at least 24 blocks in Mozambique's two main oil and gas exploration areas were available.

In 2004, Namcor launched Namibia's fourth licensing round; a fifth licensing round is expected in 2005. In March 2005, Vancouver-based EnerGulf Resources and the national petroleum Corporation of Namibia (Namcor) entered into a memorandum of cooperation to jointly explore and develop offshore Block 1171, located along the maritime border with Angola. In May 2003, Vanco Energy announced plans to drill on the Kunene oil prospect, whose reserves have been estimated as high as 1.4 billion barrels of oil and 8 trillion cubic feet (Tcf) of gas. In 2003, a joint venture between a consortium, the First African Oil Corporation, and the National

Petroleum Corporation of Namibia was awarded a concession running from the area near Rundu and Ruacana, on the border with Angola, to Tsumeb.

In June 2004, Madagascar's Office of National Mines and Strategic Industries (OMNIS) announced a new licensing round for the Morondava Basin, located off the western coast. Licenses are expected to be granted in mid-2005. Although oil is not yet produced in the region, it is thought to be under-explored and promising. In July 2004, Sterling Energy was awarded exploration licenses for the Amilobe and Ampasindaya offshore blocks, located northwest of Madagascar. The latter is adjacent to the Majunga block held by Vanco Energy since 2002. In 2004, both ExxonMobil and Norsk Hydro acquired stakes in the Majunga block. In 2000, U.S.-based Xpronet signed two PSCs with OMNIS for the Mavony and Rivomena offshore blocks.

In the Democratic Republic of the Congo, Perenco operates six onshore fields, with an output of approximately 25,000 barrels per day. Perenco is also the operator for the DRC's offshore concession and terminal - assets it acquired from ChevronTexaco in 2004. Calgary-based Heritage Oil Corp. has applications pending for two blocks in the former rebel-held areas of Eastern DRC, adjacent to Heritage's Ugandan concessions. In 2004, the DRC's national oil company, Société Nationale des Petroles du Congo (SNPC), was reorganized to become a holding company with seven subsidiaries.

In 2005, a deal was signed between the Seychelles National Oil Company, the Seychelles Petroleum Company and Louisiana-based Petroquest, giving Petroquest exploration rights to 11,583 square miles around Constant, Topaz, Farquhar and Coetivy islands for nine years.

In October 2004, Tanzania Petroleum Development Corp. (TPDC) launched its third licensing round for deepwater blocks. As of May 2005, Austria's Orphir Energy, Petrobas and Norway's Statoil had applied for the 8 available blocks. Earlier in 2004, TPDC signed production sharing agreements with Brazil's Petrobas for deepwater Block 5 off Mafia Island and with France's Maurel & Prom for acreage along the coast. Shell has yet to finalize an agreement for Blocks 9 - 12 near Zanzibar and Pemba islands, which it won over two years ago. In February 2005, large oil reserves reportedly were discovered on the islets of Nyuni and Okuza where Ndovu Resources Company, a subsidiary of UK-based Aminex PLC, subsequently was contracted to drill two new wells. Aminex completed the Nyuni-1 well in May 2004.

### **Refining**

Southern Africa's petroleum refining is concentrated in South Africa where four refineries have a combined 489,547 bbl/d capacity. Other Southern African refineries are in Angola (Luanda, 39,000 bbl/d); Madagascar (Toamasina, 15,000 bbl/d); Tanzania (Dar es Salaam, 14,900 bbl/d) and Zambia (Ndola, 23,750 bbl/d).

In May 2005, provisional approval was granted for a merger of South Africa's Sasol and Engen, owned by Malaysia's Petronas. Once final approval is granted, the merger will create the region's largest refining group and fuel distributor. In June 2005, Sasol was in negotiations to sell 13.64 percent of its share in the Natref inland refinery to Total, which already has a 36.6 percent stake in the facility.

Angola's Sonangol has announced plans to construct a second refinery near the coastal city of Lobito. The facility, with a potential refining capacity of 200,000 bbl/d, is expected to be operation in 2006. Total has plans to raise the Luanda refinery's capacity to 60,000 bbl/d. It also must be adapted to new product specifications set by SADC including phasing out lead and increasing the octane content in gasoline.

In December 2004, Madagascar's Galana Raffinerie Terminal at Toamasina was ordered to pay 86 million euros (approximately \$103 million) in tax arrears and its director general was

sentenced to seven months in prison. The survival of the refinery, which lost the markets of Mauritius and Madagascar in 2004, is uncertain. Significant investment would be necessary to fund upgrades needed to meet international anti-pollution standards.

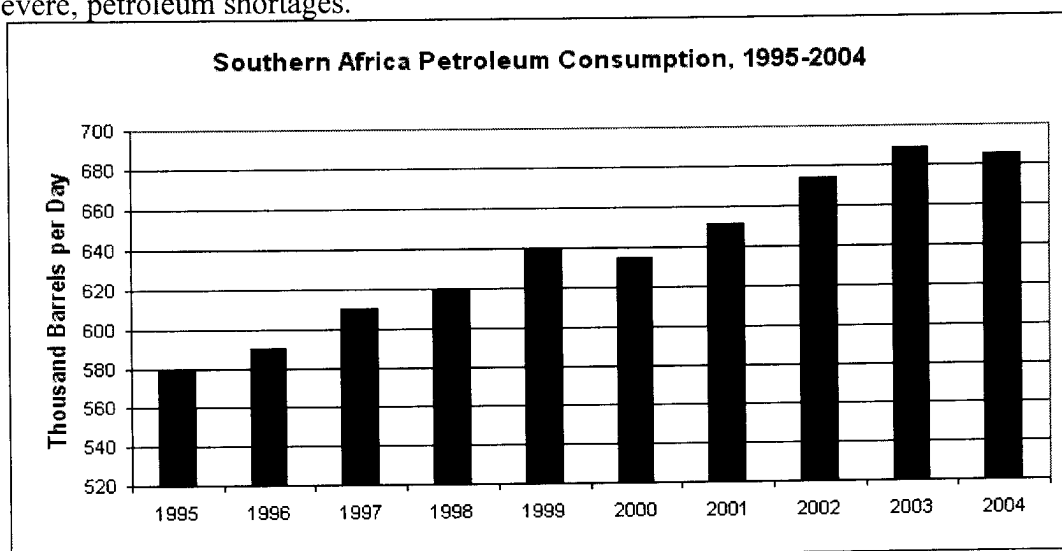
In 2003, US-registered Global Energy Overseas was awarded a license to build and operate a refinery at Walvis Bay in Namibia. The country currently has no refineries, but has been seeking to build one for several years.

In 2002, Total acquired a 50 percent interest in Zambia's Indeni refinery and agreed to provide technical support for the refinery. The Zambian government will retain control of the remaining half.

### Consumption

In 2004, petroleum consumption in Southern Africa averaged 685,000 bbl/d. The vast majority of petroleum consumed in the region is imported; Angola and DRC are the only net exporters. Several countries in the region -- particularly Zimbabwe -- have experienced periodic, sometimes severe, petroleum shortages.

All of Botswana's refined oil needs are supplied by South Africa, except for a small supply to the western part of the country by Namibia.



Namibia itself acquires 90 percent of its petroleum requirements from South Africa. Sasol was awarded a tender in September 2004 to supply Namibia for three years.

Most of Malawi's fuel imports are supplied via Tanzanian and South African ports, although additional sources of imports, via a pipeline from Mozambique, are also being developed.

In January 2004, Zambia finalized a deal with Iran to supply it with nearly 4.3 million barrels of crude oil. As of November 2004, the agreement remained on hold due to logistical and financial issues. In October 2004, however, Zambia reportedly procured oil from the Gulf region to prevent a fuel shortage.

In December 2004, a joint venture project was announced to construct an independent petroleum storage terminal in Beira, which will be tied to the Beira-Feruka pipeline that runs from Mozambique to Zimbabwe. With its added storage capacity (appx. 3.4 million cubic feet), the terminal is expected to help solve Zimbabwe's problems with erratic fuel supplies. The shareholders in the venture are the National Oil Company of Zimbabwe (Noczim), Petroleos de Mocambique (Petromoc) and the Independent Petroleum Group (IPG) of Kuwait.

The Comoros, Seychelles and Mauritius import most of their fuel energy requirements. The Indian Oil Corporation operates an 18,000-ton storage terminal on Mauritius and is planning to expand its presence on the islands.

### Oil Integration

The 1,069-mile Tazama Pipeline transports crude from Dar es Salaam, Tanzania to Zambia's Indeni refinery. The pipeline, jointly owned by the governments of Zambia (67 percent) and Tanzania (33 percent), has a capacity of 22,000 bbl/d. In October 2004, the Zambian government decided not to privatize the Tazama Pipeline due to the facility's strategic importance to the national economy. The pipeline was damaged during the December 2004 tsunami when a tanker unloading its cargo in the port was forced to lower its anchor - hitting the pipeline - to prevent being swept back to sea. Vandalism and the deterioration of pumping equipment are also serious problems.

The Mozambique-Zimbabwe Petrozim Petroleum Products Pipeline runs from the port of Beira in Mozambique through Feruka, Zimbabwe to Msasa, located near Harare. Zimbabwe imports 30 percent of its petroleum through the pipeline. Zimbabwe's Noczim is planning to construct an additional oil-product pipeline from Beira to Msasa to help meet Zimbabwe's growing oil demand.

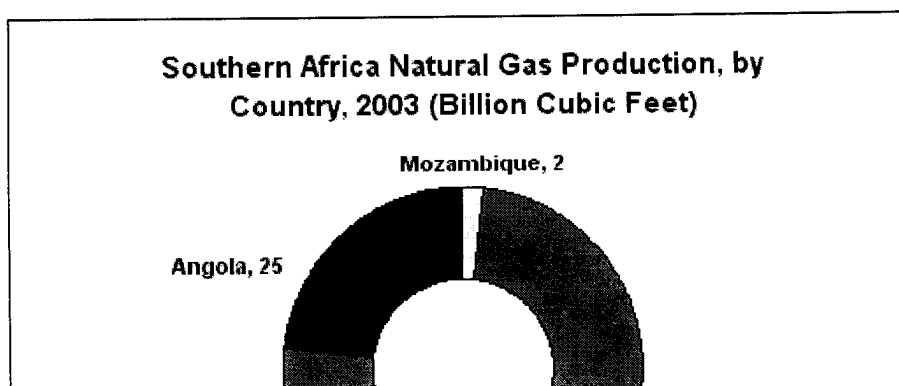
In February 2004, the Nacala Development Corridor (NDC) Project announced the start of a feasibility study for an oil pipeline to link Mozambique's seaport of Nacala to Malawi. The NDC Project (which also includes Zambia) expects the 249-mile pipeline to greatly reduce transport costs and further integrate the three countries.

### NATURAL GAS

In Southern Africa, significant natural gas reserves are located in Angola (1.6 Tcf); DRC (35 Bcf); Mozambique (4.5 Tcf); Namibia (2.2 Tcf); South Africa (1 Bcf) and Tanzania (800 Bcf) (see Table 4). Overall, the region contains approximately 1.9 percent of Africa's natural gas reserves. Several projects are underway to expand use of natural gas in the region.

Angola is developing projects to utilize associated natural gas. ChevronTexaco and a consortium of oil companies, including ExxonMobil, BP, Total and Norsk Hydro, are planning to gather associated natural gas from deepwater fields and develop shallow water fields in the Congo Basin as part of the Angola liquefied natural gas (LNG) project. The LNG facility is to be built at Soyo in northern Angola. In April 2005, the front-end engineering design (FEED) contract was awarded to Bechtel and a consortium of Halliburton's KBR, JGC of Japan and Technip. A final investment decision is expected in 2006. The Angola LNG project will likely come onstream in 2010.

The Namibian government announced in October 2004 that gas from the Kudu field (discovered in 1974) could start flowing in 2009. Feasibility studies are currently underway. The \$1 billion project is being developed by the state-owned companies, Namcor and NamPower, in partnership with Energy Africa and Eskom. It includes the development of Kudu, which has estimated proven reserves of 1.3 Tcf, and the construction of an 800-MW power plant. This progress has come after ten years of negotiations during which Shell and ChevronTexaco both pulled out (in 2002 and 2003, respectively).



In November 2004, EastCoast Energy Corp. began to sell natural gas from Tanzania's Songo Songo gas field to industrial users in Dar es Salaam. In July 2004, Tanzania began to produce electricity

Ubungo power plant, also in Dar es Salaam. Songo Songo, the country's largest known field, is located in the Indian Ocean southeast of the capital. An estimated 1.4 Mmcf per day of gas has been supplied via a 130-mile pipeline since the field came online in July 2004. The pipeline may be extended to the Kenyan port city of Mambasa.

Tanzania also has natural gas reserves in the Mnazi Bay, which could be piped to Mtwara for use in power generation. A proposed 15-MW generating plant remains on hold until energy sector reforms are completed.

South Africa's FA field currently produces at a rate of 194 Mmcf/d of natural gas and 9,500 bbl/d of condensate. An offshore natural gas discovery was made in March 2000 close to South Africa's border with Namibia. Located in Block 2, off South Africa's western coast, the Ibhubezi field is likely part of the reservoir that extends to Namibia's Kudu prospect. US-based companies Forest Oil Corporation (Forest) and Anschutz, along with Mvelaphanda, are exploring the Ibhubezi field (15 Tcf). In August 2003, PetroSA purchased a 30 percent share in the Ibhubezi Gas Field project. The consortium hopes to begin production in 2006.

In February 2004, South Africa's Sasol announced the first delivery to its plant at Secunda from the Temane natural gas fields in Mozambique. The gas was delivered via a 536-mile pipeline as part of a \$1.2 billion pipeline and gas development project that is a joint venture of Sasol and the governments of Mozambique and South Africa. In March 2005, a pipeline linking the Temane natural gas fields to Matola, Mozambique was opened, providing an energy source for industry in the region.

Since September 2003, South Africa has been following a general timetable for the construction of natural gas pipelines. With the completion of the gas pipeline between Temane and Secunda, South Africa will build another to supply the Western Cape from either the Kudu fields in Namibia or the Ibhubezi field. A third planned pipeline will link the West coast to Guateng province via Sishen, followed by a fourth to supply Port Elisabeth.

Exploration for additional gas reserves in Mozambique continues. Two wells recently drilled by Norway's Det Norsk Olse-Selskap (DNO) in the Inhaminga Block were dry. In June 2005, Sasol signed an exploration and production contract for Blocks 16 and 19, covering over 4,247 square miles, offshore Mozambique.

In March 2004, the US Trade and Development Agency (USTDA) provided a grant to the Botswana Development Corporation (BDC) to complete a feasibility study on the development of a coal bed methane (CBM) project. Commercial production of the CBM from a pilot project at the Lephehe coal field is to begin in August 2005. The area contains an estimated 12.8 Tcf of CBM. Additional studies of the Kalahari Karoo basin have found that the area could contain a total of 196 Tcf of gas-in-place resources.

## **COAL**

Coal resources are abundant in Southern Africa, especially in South Africa, where recoverable reserves are estimated at 55.1 billion short tons (6 percent of world recoverable coal reserves). In 2003, regional coal production reached 269 million short tons (Mmst), of which South Africa produced nearly 264 Mmst (see [Table 5](#)). South Africa also consumed the vast majority (97 percent) of the region's coal in 2003.

In late 2004, the Brazil's Companhia do Vale do Rio Doce (CVRD), was awarded the rights to exploit coal deposits in Mozambique's Moatize mines. Moatize in northwestern Mozambique is considered to be the largest unexplored coal province in the world, with an estimated 2.4 billion tons of reserves. Additional studies on the extent of the coal reserves and the feasibility of the

redevelopment of the mines began in early 2005. The project will likely include the development and improvement of mine facilities and a power station. Indian company, Rites & Ircon, has already won a tender to construct a rail line between the mine and the ports of Nacala and Beira, which also can be used by Zimbabwe, Malawi, Zambia and DRC. A new deepwater port north of Beira is also expected.

Despite reserves of approximately 2.3 Mmst, Malawi's Mchenga coal mine continues to produce below peak output due to financial constraints. In late 2004, coal-mining firm Mchenga Coal Mines began a six month program to search for additional reserves in the northern Livingstonia coalfields. The Lengwe and Mwabvi fields in the southern Shire River valley area also are unexploited.

Zimbabwe's petroleum shortages have affected the country's coal industry. The National Railways of Zimbabwe (NRZ), which transports the majority of the coal produced at Zimbabwe's Wankie Colliery, has been forced to ground some of its trains because of diesel fuel shortages. In May 2005, Rio Tinto Zimbabwe (RioZim) was seeking investors for the stalled Sengwa coal project. According to RioZim, the area could have 2.2 billion short tons of coal reserves.

There has been recent interest in reopening Swaziland's Emaswantini coal mine to help reduce electricity importation costs. In June 2004, Meepong Investments acquired the rights to coal reserves, believed to be in excess of 600 Mmst, in the Mmamabula east reserve in Botswana. In 2004, the Morupule Colliery in Botswana reported that it had experienced a decreased output as a result of machinery breakdown, while production at Zambia's Maamba Collieries rose.

## **ELECTRICITY**

As of January 1, 2003, Southern Africa's total installed electric generating capacity was 52,272 MW (see Table 6). The largest electricity generator by far was South Africa (215.9 bkwh), followed by Mozambique (15.1 bkwh), Zimbabwe (8.9 bkwh), and Zambia (8.4 bkwh). In 2003, total regional electricity consumption was 244.4 bkwh, led by South Africa (197.4 bkwh), Zimbabwe (11.6 bkwh), Mozambique (10.5 bkwh) and Zambia (5.8 bkwh).

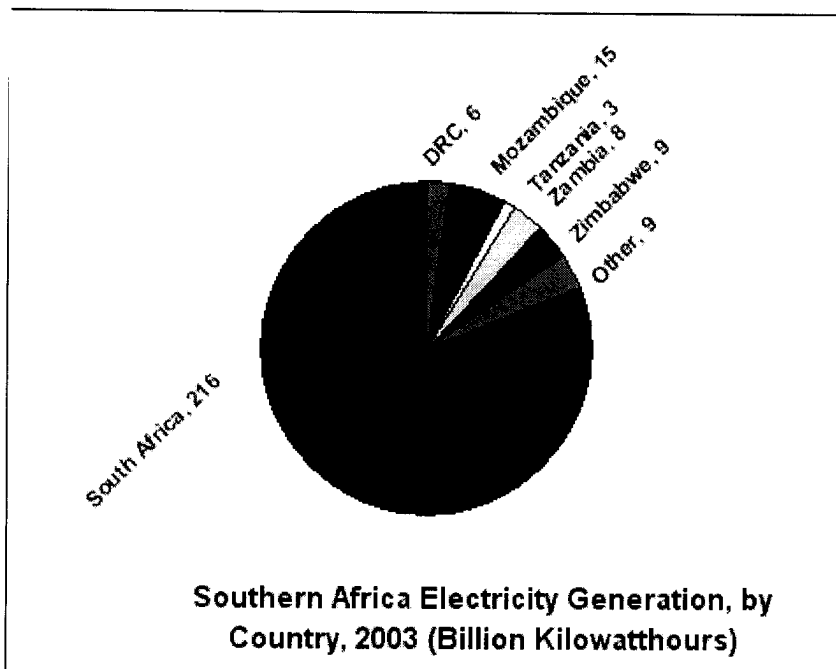
Created in 1995, the Southern African Power Pool (SAPP) aims to provide reliable and economical electricity to the consumers of each member. The national utilities participating in the SAPP are Angola's Empresa Nacional de Electricidade (ENE), the Botswana Power Corporation (BPC), the DRC's Société Nationale d'Electricité (SNEL), the Lesotho Electricity Corporation (LEC), Malawi's Electricity Supply Commission (MESCOM), Electricidade de Mocambique (EDM), Namibia's NamPower, South Africa's Eskom, the Swaziland Electricity Board (SEB), Tanzania Electric Supply Company (TanESCO), Zambia Electricity Supply Corporation (ZESCO) and Zimbabwe Electricity Supply Authority (ZESA), as well as Mozambique's Independent Power Producer, Hidroelectrica De Cahora Bassa, and the transmission company, Motraco, a joint venture of Eskom, EDM and SEB. SAPP's coordination center is located in Harare, Zimbabwe.

Eskom, South Africa's state-owned electricity supplier, supplies more than 95 percent of the country's electricity and is a significant provider of energy to Southern Africa. Around 74 percent of South Africa's electricity supply comes from coal-fired power stations. Africa's only nuclear power plant is in Koeberg, located near Cape Town, supplies electricity to the Western Cape province. It has a further active life span of about 30-40 years.

Although parts of Southern Africa already suffer from intermittent power disruptions, a serious power crisis is expected to affect much of the region by 2007, if investments in new energy projects are not made. This is largely due to the region's dependence on Eskom, which is running out of excess capacity. Regional demand for electricity already has begun to outstrip



Eskom's supply and the problem is only expected to grow.



The DRC has extensive energy resources, including a potential hydroelectric capacity of approximately 100,000 MW. The Inga dam alone, on the Congo River, has a potential capacity of 40,000-45,000 MW, which could supply all of Southern Africa's electricity needs. Due to continuing political uncertainties and the resulting lack of investor interest, only a fraction of this amount has been developed. Total installed generating capacity was estimated at 2,473 MW in 2001. However, actual

production is estimated at no more than 650-750 MW because two-thirds of the turbines are not functioning. The DRC exports hydroelectricity to its neighbor, Republic of Congo along a 220-kilovolt (KV) connection. The interconnection supplies nearly one third of the electricity consumed in Congo-Brazzaville. Power from Inga is also transmitted to the Zambian grid along a 500-KV DC line from Inga to Kolwezi in southern DRC, and a 220-KV line from Kolwezi to Kitwe in northern Zambia. South Africa also imports DRC's energy output through the SAPP grid.

In November 2003, BPC, Eskom, ENE, NamPower and SNEL formed the Westcor Power Project in order to provide low-cost and environmentally friendly electricity to ensure the economic development of the region. The first phase of the project includes the construction of the 3,500-MW Inga III hydropower station in DRC, with interconnections for about 1,864 miles of power transmission lines to supply the five Westcor countries. In August 2004, the DRC indicated that, as the host country, it would like more than the 20 percent stake allotted to it - stalling the project. A further phase beyond Inga III, Grand Inga, with a potential output of some 39,000 MW, would follow. The Western Power Project may eventually include the construction of hydropower stations in Angola and Namibia. Depending on the outcome of the feasibility studies, the project is due to begin in 2010.

Mozambique's Cahora Bassa hydroelectric facility is located on the Zambezi river in the western province of Tete. The power station, with a nominal capacity estimated at 2,075 MW, currently supplies electricity domestically, as well as to Zimbabwe and South Africa. Cahora Bassa is operated by Hidroelectrica de Cahora Bassa (HCB), a joint-venture between Portugal (82 percent) and EDM (18 percent). The government of Mozambique has expressed a desire to have the facility transferred to majority Mozambican ownership. After negotiations stalled in late 2004, no date has been set for new talks. Currently, Mozambique is seeking funds to modernize the Cahora Bassa facility at an expected cost of \$40 million. In addition, the government is seeking investors for a new 2,400-MW hydroelectric facility on the Zambezi River, about 43 miles south of the Cahora Bassa dam. Once construction is underway, it could take up to eight years for generation to begin. South Africa's Eskom has expressed interest in constructing a 100-MW power station adjacent to Mozambique's Moatize coal fields.

Malawi's Shire river supports four hydroelectric plants, which account for the majority of the

country's electrical output. A 31-mile power-supply link from Mozambique's Cahora Bassa dam, is under construction; however, a lack of resources has prevented the project from moving forward. Additional work continues on the Kapichira hydroelectric power scheme that is designed to add 128 MW to the country's capacity.

Lesotho's dependence on imported electricity from South Africa ended with the 1998 opening of the Muela hydroelectric power station, part 1A of the Lesotho Highlands Water Project (LHWP). Fully operational since January 1999, the plant has a capacity of 80 MW, which is due to increase to 110 MW when phase 2 of the LHWP goes ahead. In 2004, Lesotho sought investors for 70 percent of the Lesotho Electricity Company (LEC), which owns four small hydroelectric plants, as well as distribution and transmission assets. The privatization is expected to allow the LEC to improve rural electrification.

In August 2003, the Swaziland Electricity Board (SEB) and the European Investment Bank (EIB) signed a \$9.3 million loan agreement for the construction of a hydroelectric power station at the Maguga dam on the Komati River. In November 2004, Alston Power and Consolidated Power Ltd. signed contracts with the SEB to supply and install turbines and generators, as well as to construct and commission substations for the Maguga power project. The Maguga project is part of the Swazi government's plan to reduce the importation of electricity. About 80 percent of the country's electricity is supplied by South Africa.

Botswana plans to provide electricity to 70 percent of the population by March 2009 and to the rest of its citizens by 2016. Currently, only 22 percent of Botswana's population has access to electricity. The generating capacity of the Botswana Power Corporation (BPC) is centered at the 132-MW Morupule power station. Nearly 70 percent of national demand is fulfilled by power imports. Through government funding, BPC is engaged in a major program to extend the electricity grid into rural areas, the largest phase of which was completed in early 2004.

In January 2004, the South African government announced its intentions to encourage the private sector to move into power generation in the country. In March 2005, Eskom awarded plant upgrade contracts to U.S.-based Fluor Corp. and South Africa's Pangaea for a 200-MW coal-fired power station. The first unit is expected to be operational by 2007.

Madagascar is currently suffering from a series of blackouts, following the depletion of fuel stocks. In 2004, the state-run electricity supplier, Jirama, was authorized to import fuel, rather than purchase it from the Toamasina refinery. Mismanagement and rising oil prices have left Jirama facing bankruptcy.

About 50 percent of Namibia's electricity is generated domestically, mainly from the 240-MW Ruacana hydropower plant. The production level is cyclical, so imports from South Africa are needed to cover the periodic gaps in production. The Ruacana plant recently has experienced severe malfunctioning, increasing the need for imported power. With the current import agreements between Namibia and South Africa scheduled to expire in 2006 and South Africa's declining excess capacity, Namibia has begun to prepare itself for the reduced power supply. The Namibian government is actively seeking new energy sources, including the proposed 800-MW gas-fired power plant by the Kudu gas fields, a wind powered plant at Luderitz and potential hydroelectric supplies from the Kunene River on the Angolan border. In 2005, the Namibian government reactivated old power stations in Walvis Bay and Windhoek as an interim measure, but power rationing may soon become necessary.

In May 2004, Namibia's Nam Power commissioned a feasibility study on the viability of a 30-MW hydroelectric plant at the Popa Falls on the Okavango river. An earlier plan was rejected due to concerns over possible damage to the Okavango Delta, located downstream from the falls in neighboring Botswana. Nam Power continues to back the project, which would provide

a much needed power source. Namibia and Zambia have also begun the construction of a power line between Katima Mulillo and Victoria Falls.

While Zimbabwe imports about 35 percent of its electricity requirements, the country's power supply has grown increasingly irregular over the past year. The country will likely experience temporary power shortfalls throughout 2005. In 2004, Eskom of South Africa and HCB of Mozambique both refused to renew contracts with the Zimbabwe Electricity Supply Authority (ZESA). In March 2005, a transmission failure in the DRC has left ZESA unable to import electricity from SNEL. At the same time, generators at Zimbabwe's Kariba and Hwange power stations have gone offline due to a shortage of spare parts. Construction of a thermal plant at the Sengwa Coal mine has been delayed due to lack of investor interest.

In late 2004, however, Zimbabwe's government signed contracts with China's National Aero-Technology Import (Caltic) and China Electric Technology Import and Export Corporation (Cetic) to expand the Kariba and Hwange stations and with Iran for the construction of an additional gas powered plant. Also in 2004, Zesa was split into four separate companies.

In 2004, Tanzania's electricity supply remained erratic due to the country's dependence on hydroelectric power. After a drought in 2004, all of Tanzania's hydroelectric plants were operating at half capacity, leading to the implementation of a World Bank-funded Emergency Power Plan. By 2005, the Tanzania Electricity Supply Company (Tanesco) hopes to generate only 40 percent of its electricity from hydro stations and the remaining 60 percent from thermal plants. The 100-MW gas-powered Songas plant in Ubungo went on-line in August 2004 and was expanded to 180 MW in June 2005. Zambia, Tanzania and Kenya are also pursuing a \$230 million project to connect their grids. Rwanda and Uganda have expressed interest in joining the Zambia-Tanzania-Kenya interconnection.

Zambia has abundant hydroelectric resources and meets most of its energy needs from its own hydroelectric stations, which are operated by the state-owned Zambia Electricity Supply Company (Zesco). Zambia exports electricity to its neighbors, especially Tanzania and Kenya. In May 2005, the Zambian government was seeking funds for an expansion of the national grid to the eastern province. The extended grid will be constructed by Mohan, an Indian power company. In September 2004, Malawi's Escom announced that it could connect Zambia's Chama district, only 3 miles from the Malawian border, to its grid. In 2004, Zesco announced a \$240 million project to rehabilitate Zambia's power stations that have received poor maintenance in the past. Also in 2004, Iran was awarded a contract to construct a 120-MW hydroelectric power station, upstream of the Kafue Gorge Dam.

Mauritius is the only country in Africa to boast full electrification, largely thanks to its early start and political commitment to electrification. Liquefied petroleum gas is becoming an increasingly popular energy source on the island.

#### **RENEWABLE ENERGY/ENVIRONMENT**

In 2001, the Compagnie Thermique de Belle Vue (CTBV), a joint-venture composed of Harel Frères of Mauritius, France's Cidec, the Sugar Investment Trust of Mauritius and the State Investment Fund, built a 70-MW IPP facility north of the Mauritian capital of Port Louis. The CTBV plant utilizes bagasse (biomass refuse from the processing of sugar cane) as its primary fuel. Swaziland has expressed interest in a bagasse power plant; however, the project has been stalled for seven years. The U.S. Trade and Development Agency is currently financing a feasibility study of a planned bagasse power plant in Tanzania.

In November 2001, a 20-MW steam-turbine/generator for a sugar mill near Chirezdi, Zimbabwe was commissioned. Due to the difficult economic and political situation in the country, the project remains on hold.

Solar energy is viewed as a prime tool for Southern Africa's rural (off-grid) electrification programs, which have been slowed by the high costs of grid extension services. Zambia's government has encouraged investment by eliminating all import duties on solar panels and waiving the otherwise obligatory annual license fees for solar energy projects. In November 2004, the Gobabeb hybrid mini-grid installation in the Namib desert was inaugurated. It is the largest solar power station in Namibia.

Southern Africa faces various environmental problems, including pollution of water supplies, deforestation, desertification, pollution associated with oil and gas development, and dramatic decline in biodiversity throughout the region.

*Sources for this report include: Africa Analysis; African Energy; Africa Energy Intelligence; AllAfrica.com; BBC News; CIA World Factbook; Economist Intelligence Unit; Energy Information Administration; Factiva Inc.; Global Insight; International Monetary Fund; Mbendi; Oil and Gas Journal; Petroleum Economist; Reuters; U.S. Energy Information Administration; World Bank; World Markets Analysis.*

## SUMMARY TABLES

<b>Table 1. Economic and Demographic Indicators</b>					
<b>Country</b>	<b>Gross Domestic Product (GDP), 2004E (Billions of U.S. \$)</b>	<b>Real GDP Growth Rate, 2004 Estimate</b>	<b>Real GDP Growth Rate, 2005 Projection</b>	<b>Per Capita GDP, 2004E</b>	<b>Population 2004E (Millions)</b>
Angola	\$20	12.2%	14.4%	\$1,381	14.8
Botswana	\$9	5.4%	4.8%	\$4,852	1.7
Comoros	\$0.4	1.6%	2.8%	\$579	0.6
Democratic Republic of Congo	\$6.0	5.7%	6.0%	\$110	54.8
Lesotho	\$1.5	4.4%	4.8%	\$682	2.1
Madagascar	\$3.7	4.7%	5.5%	\$211	17.4
Malawi	\$2.8	3.6%	4.5%	\$248	11.2
Mauritius	\$6.3	4.1%	4.3%	\$5174	1.2
Mozambique	\$6.0	7.3%	6.1%	\$305	19.2
Namibia	\$5.0	4.4%	3.8%	\$2,524	1.9
Seychelles	\$0.7	-2.0%	0.5%	\$8,348	0.1
South Africa	\$213.1	3.7%	4.0%	\$4,562	46.7
Swaziland	\$2.0	2.1%	1.8%	\$1,772	1.1
Tanzania	\$11.0	5.7%	5.8%	\$266	42.1
Zambia	\$5.0	4.6%	4.8%	\$489	10.7
Zimbabwe	\$3.9	-4.3%	-1.4%	\$296	13.2
<b>Regional Total/Average</b>	<b>\$296.4</b>	<b>4.0%</b>	<b>4.5%</b>	<b>\$1,985</b>	<b>238.8</b>

*Source: Global Insight*

<b>Country</b>	<b>Total Commercial Energy Consumption, (Quadrillion Btu)</b>	<b>Total Commercial Energy Production, (Quadrillion Btu)</b>	<b>Net Energy Exports, (Quadrillion Btu)</b>	<b>Carbon Dioxide Emissions (Million metric tons of carbon)</b>
Angola	0.135	1.960	1.825	4.34
Botswana	0.052	0.023	-0.029	1.04
Comoros	0.001	0.000	-0.001	0.03
Democratic Republic of Congo	0.080	0.112	0.032	0.49
Lesotho	0.007	0.004	-0.003	0.06
Madagascar	0.037	0.006	-0.031	0.61
Malawi	0.025	0.013	-0.012	0.22
Mauritius	0.052	0.001	-0.051	1.01
Mozambique	0.166	0.157	-0.009	0.47
Namibia	0.051	0.015	-0.036	0.63
Seychelles	0.016	0.000	-0.016	0.32
South Africa	4.901	5.916	1.015	112.16
Swaziland	0.021	0.011	-0.010	0.37
Tanzania	0.078	0.032	-0.046	0.96
Zambia	0.108	0.090	-0.018	0.61
Zimbabwe	0.189	0.136	-0.053	3.01
<b>Regional Total</b>	<b>5.919</b>	<b>8.473</b>	<b>2.557</b>	<b>126.33</b>

Sources: Energy Information Administration

<b>Country</b>	<b>Petroleum Production, 2004 (Thousand Barrels Per Day)</b>	<b>Petroleum Consumption, 2004 (Thousand Barrels Per Day)</b>	<b>Petroleum Net Exports, 2004 (Thousand Barrels Per Day)</b>	<b>Crude Oil Reserves, 1/1/2005 (Million Barrels)</b>	<b>Crude Oil Refining Capacity, 1/1/2005 (Thousand Barrels Per Day)</b>
Angola	1,051.2	57.0	994.2	5,412.0	39.0
Botswana	0.0	13.0	-13.0	0.0	0.0
Comoros	0.0	1.0	-1.0	0.0	0.0
Democratic Republic of Congo	21.1	7.0	14.1	187.0	0.0
Lesotho	0.0	2.0	-2.0	0.0	0.0
Madagascar	0.0	12.0	-12.0	0.0	15.0
Malawi	0.0	6.0	-6.0	0.0	0.0
Mauritius	0.0	27.0	-27.0	0.0	0.0
Mozambique	0.0	11.0	-11.0	0.0	0.0
Namibia	0.0	23.0	-23.0	0.0	0.0

Seychelles	0.0	4.0	-4.0	0.0	0.0
South Africa	250.8	466.0	-215.2	15.7	489.5
Swaziland	0.0	3.0	-3.0	0.0	0.0
Tanzania	0.0	22.0	-22.0	0.0	14.9
Zambia	0.1	13.0	-12.9	0.0	23.8
Zimbabwe	0.0	18.0	-18.0	0.0	0.0
<b>Regional Total/Average</b>	<b>1,323.2</b>	<b>685.0</b>	<b>639.1</b>	<b>5,614.7</b>	<b>582.2</b>

Sources: Energy Information Administration, Oil & Gas Journal

Country	Production, 2003	Consumption, 2003	Reserves, 1/1/2005
Angola	25.43	25.43	1,620
Botswana	0.00	0.00	0
Comoros	0.00	0.00	0
Democratic Republic of Congo	0.00	0.00	35
Lesotho	0.00	0.00	0
Madagascar	0.00	0.00	0
Malawi	0.00	0.00	0
Mauritius	0.00	0.00	0
Mozambique	2.12	2.12	4,500
Namibia	0.00	0.00	2,200
Seychelles	0.00	0.00	0
South Africa	82.99	82.99	1
Swaziland	0.00	0.00	0
Tanzania	0.00	0.00	800
Zambia	0.00	0.00	0
Zimbabwe	0.00	0.00	0
<b>Regional Total</b>	<b>110.54</b>	<b>110.54</b>	<b>9,156</b>

Sources: Energy Information Administration; Oil and Gas Journal

Country	Production, 2003	Consumption, 2003	Reserves
Angola	0.00	0.00	0.00
Botswana	0.99	1.02	44.00
Comoros	0.00	0.00	0.00
Democratic Republic of Congo	0.11	0.26	97.00
Lesotho	0.00	0.00	0.00
Madagascar	0.00	0.01	0.00
Malawi	0.00	0.02	2.00
Mauritius	0.00	0.32	0.00

Mozambique	0.05	0.01	234.00
Namibia	0.00	0.00	0.00
Seychelles	0.00	0.00	0.00
South Africa	263.78	187.76	53,738.00
Swaziland	0.41	0.41	229.00
Tanzania	0.09	0.09	220.00
Zambia	0.22	0.21	11.00
Zimbabwe	3.74	3.53	553.00
<b>Regional Total</b>	<b>269.39</b>	<b>193.64</b>	<b>55,128.00</b>

Sources: Energy Information Administration

Country	Consumption, 2003	Generation, 2003	Installed Capacity, 1/1/2003 (gigawatts)	Exports, 2003	Imports, 2003
Angola	1.78	1.92	0.635	0.00	0.00
Botswana	2.26	0.94	0.132	0.00	1.39
Comoros	0.02	0.02	0.005	0.00	0.00
Democratic Republic of Congo	4.32	6.04	2.548	1.30	0.01
Lesotho	0.36	0.35	0.076	0.00	0.04
Madagascar	0.77	0.83	0.284	0.00	0.00
Malawi	1.21	1.30	0.303	0.00	0.00
Mauritius	1.81	1.94	0.655	0.00	0.00
Mozambique	10.46	15.14	2.392	9.50	5.88
Namibia	2.37	1.46	0.00	0.06	1.07
Seychelles	0.22	0.24	0.028	0.00	0.00
South Africa	197.37	215.88	40.481	10.14	6.74
Swaziland	1.16	0.39	0.124	0.00	0.80
Tanzania	2.96	3.15	0.862	0.00	0.03
Zambia	5.76	8.35	1.786	2.00	0.00
Zimbabwe	11.56	8.88	1.961	0.00	3.30
<b>Regional Total</b>	<b>244.39</b>	<b>266.83</b>	<b>52.272</b>	<b>23.00</b>	<b>19.26</b>

Sources: Energy Information Administration

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