

COUNTRY ANALYSIS BRIEFS

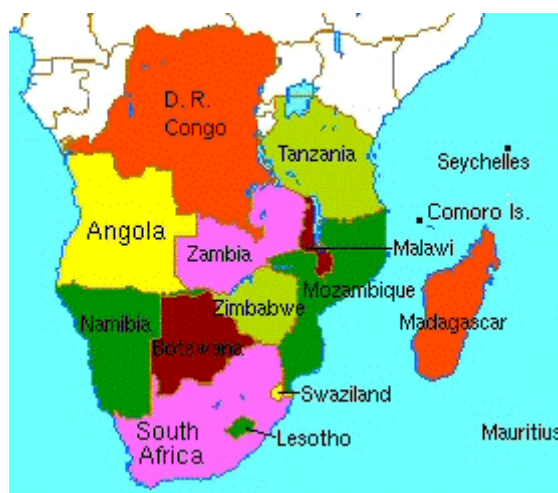
Southern Africa (SADC)

Last Updated: June 2006

Background

The Southern African Development Community's (SADC) ultimate goal is to raise the living standards of all people in the region. To achieve this goal, SADC members are working to develop and integrate their economies in order to eradicate poverty.

The Southern African Development Coordination Conference (SADCC), which evolved into the [Southern African Development Community \(SADC\)](#), has been in existence since 1980. The original nine member-countries were [Angola](#), Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia, and Zimbabwe. [South Africa](#) joined SADC in 1994 followed by Mauritius (1995), and the Democratic Republic of Congo (DRC, 1997). In 2005, SADC granted Madagascar membership. In addition to belonging to SADC, Angola, DRC, Madagascar, Malawi, Mauritius, Swaziland, Zambia and Zimbabwe are members of the [Common Market for Eastern and Southern Africa \(COMESA\)](#).



In order to facilitate development in the region, member-states in SADC formulated various objectives which the community works to achieve. Among those objectives are the promotion of regional economic integration, creation of intra-governmental policies, and sustainable utilization of natural resources. In addition to the broader objectives of SADC, the region's [Trade Protocol](#) calls for member-states to further liberalize intra-regional trade, while eliminating trade barriers in order to establish a Free Trade Area (FTA) by 2008. The creation of the FTA is part of a strategic plan announced by the SADC executive secretary in 2004, which also includes the establishment of an SADC customs union by 2010, a common market pact by 2012, and establishment of an SADC central bank and preparation for a single SADC currency by 2016.

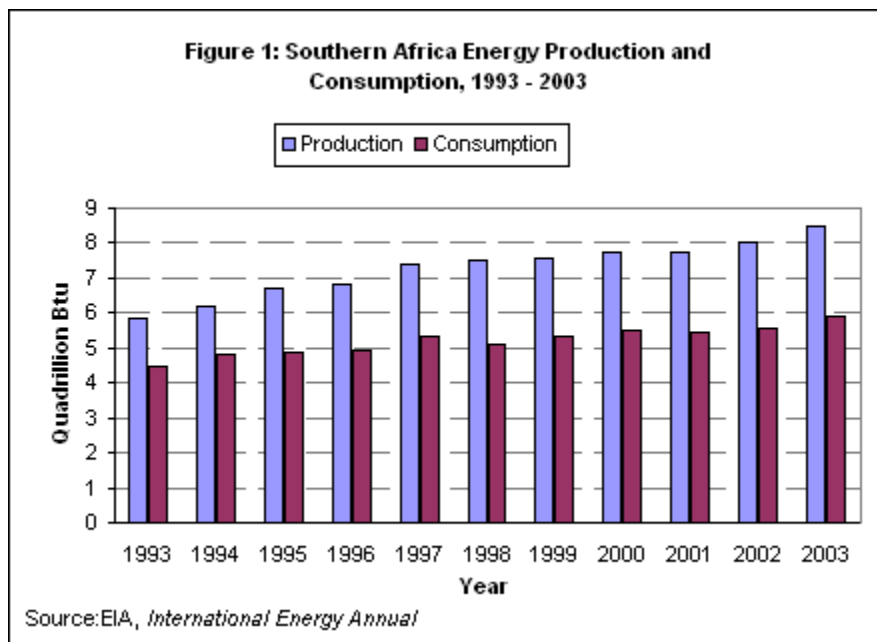
ECONOMIC OVERVIEW

In 2005, the combined Gross Domestic Product (GDP) for SADC was approximately \$330.1 billion (see [Table 1](#)). South Africa, the region's most developed economy, had GDP of \$239.4 billion, which is more than double the combined GDP of other SADC countries. In 2005, GDP growth rates in SADC ranged from -10.3 percent (Zimbabwe) to 15.9 percent (Angola), while the weighted average GDP growth rate was 5.7 percent in the region. Poverty is one of the major challenges facing SADC, with 70 percent of the population living on less than \$2 per day.

ENERGY OVERVIEW

The SADC [Energy Protocol](#) outlines the various principles and objectives that the region has towards energy. Chief among those is SADC's desire to use energy to support economic growth and development in the region. Overall, SADC is a net energy exporter. In 2003, the countries belonging to SADC collectively consumed (see [Table 2](#)) 5.9 quadrillion British thermal units (Btu) (1.4 percent of total world consumption) and produced 8.5 quadrillion Btu (2.0 percent of total world production). The region's dominant economy, South Africa, accounted for 83 percent (4.9 quadrillion Btu) of the region's energy consumption, 69.8 percent (5.9 quadrillion Btu) of its energy

production, and 88.8 percent (112 million metric tons) of its CO₂ emissions.



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

Oil

Because of Angola's large oil production, the SADC region is a net petroleum exporter.

Angola, Southern Africa's only significant oil producer, produced an average of 1.25 million barrels per day (bbl/d) of oil in 2005 (see [Table 3](#)). According to *Oil and Gas Journal (OGJ)*, Angola has proven crude reserves of 5.4 billion barrels, which constitute 96 percent of the region's total estimated proven crude reserves. Smaller proven 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

Angola

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 2005, Chevron began production at its Sanha natural gas complex and Bomboco oil field, both of which are located in Block Zero. Chevron is also working to bring its Benguela, Belize, Lobito, and Tomboco fields on Block 14 onstream in 2007. ExxonMobil operates the \$3.4 billion Kizomba A field (located in Block 15), which began production in August 2004. Kizomba A is targeted to have peak production of 250,000 bbl/d. First oil from the Kizomba B field came online in July 2005, while the Kizomba C field could begin production as early as 2007. In 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. BP is planning to bring first oil online from the Greater Plutonio project on Block 18 in 2007. In 2005, BP, in partnership with ExxonMobil, Statoil, and Marathon Oil, announced a total of five new oil discoveries on Block 31, which brings the total of discovered wells on the block to nine. For more information on the oil sector in Angola, please see the [Angola Country Analysis Brief](#).

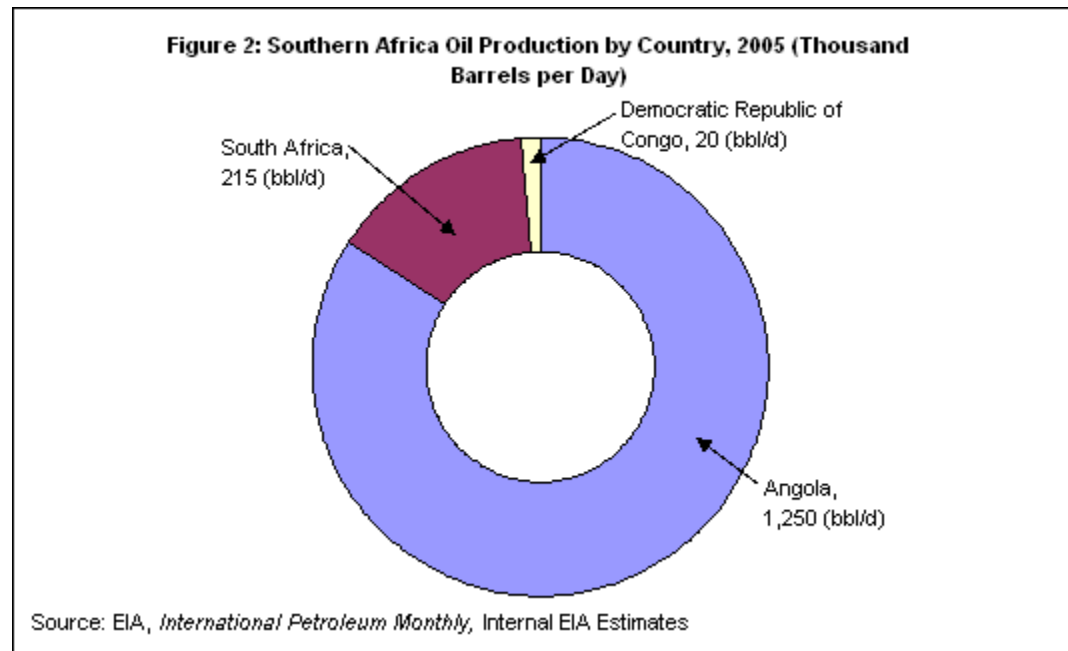
South Africa

South Africa's oil production meets 10 percent of its domestic needs. The South African national oil company, PetroSA has concentrated its exploration efforts on the country's western and southern

coasts. Several discoveries have been made in the Bredasdorp Basin on Block 9, including the Oribi, Oryx and Sable fields. Combined, the Oribi and Oryx fields produce 16,000 bbl/d of oil; however, PetroSA has indicated that both fields are in decline. Production at the Sable Field, located approximately 60 miles off the southern coast, commenced in August 2003. The project is a partnership between PetroSA and Pioneer and includes six subsea wells connected to a floating, production, storage and offloading vessel (FPSO) with the capacity to process 60,000 bbl/d of oil. Current production at Sable is around 23,000 bbl/d of oil. For more information on the oil sector in South Africa, please see the [South Africa Country Analysis Brief](#).

Democratic Republic of Congo

In DRC, Perenco operates six onshore fields, with an output of approximately 20,000 barrels per day. Perenco is also the operator of DRC's offshore concession and terminal - assets it acquired from Chevron in 2004. In 2004, DRC's national oil company, Société Nationale des Petroles du Congo (SNPC), was reorganized to become a holding company with seven subsidiaries.



Madagascar

In April 2006, Madagascar opened up 96 new offshore oil and natural gas blocks for tender. The government will accept bids from interested parties until November 17, 2006. The licensing round is overseen by the Office des Mines Nationales et des Industries Strategiques (OMNIS) and TGS-Nopec, which completed seismic data on the blocks. In 2005, U.K.-based Sterling Energy sold 70 percent of offshore Ambilobe and Ampasindava licenses to ExxonMobil. ExxonMobil plans to finance exploration work on the licenses. Additional international oil and natural gas companies active in Madagascar include Norsk Hydro (Norway), Vanco (U.S.), Vuna Resources (China) and Sun-Pec (China).

Namibia

In August 2005, BHP Billiton (Australian), Hunt Oil (U.S.), and Neptune Petroleum (U.K.) signed memoranda of understanding (MoUs) with Namibia's Ministry for Mines and Energy. The MoUs allow the companies exploration rights for two years, with the option to renew the licenses at the end of that period. In March 2005, EnerGulf Resources (Canada) signed an MoU with the National Petroleum Corporation of Namibia (Namcor) to jointly explore and develop offshore Block 1171, which is located along the maritime border with Angola.

Tanzania

In May 2005, the Tanzania Petroleum Development Corporation (TPDC) offered OphirEnergy (Austria), Statoil (Norway) and Petrobras (Brazil) production sharing agreements (PSAs). In October 2005, Ophir Energy signed the PSA for Block One, while Statoil and Petrobras are still negotiating contracts for their PSAs. In 2004, TPDC signed with Petrobras for deepwater Block Five, off Mafia Island and with Maurel & Prom (France) 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.

Mozambique

In February 2005, Mozambique launched its second offshore licensing round for blocks in the northern Rovuma basin. In June 2005, the Mozambican Empresa Nacional de Hidrocarbonetos (ENH) and the South African petrochemical company Sasol signed an agreement with the Mozambican government for Blocks 16 and 19 off the southern coast of Mozambique. Seismic studies and exploratory drilling on the blocks are expected to cost \$7 million. In May 2006, the Mozambican government awarded Norsk Hydro two concessions in the Rovuma basin and companies Eni, Petrobras and Petronas are seeking concessions in the basin as well.

Refining

Southern Africa's petroleum refining capacity is concentrated in South Africa, where four refineries have a combined 504,547 bbl/d distillation 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).

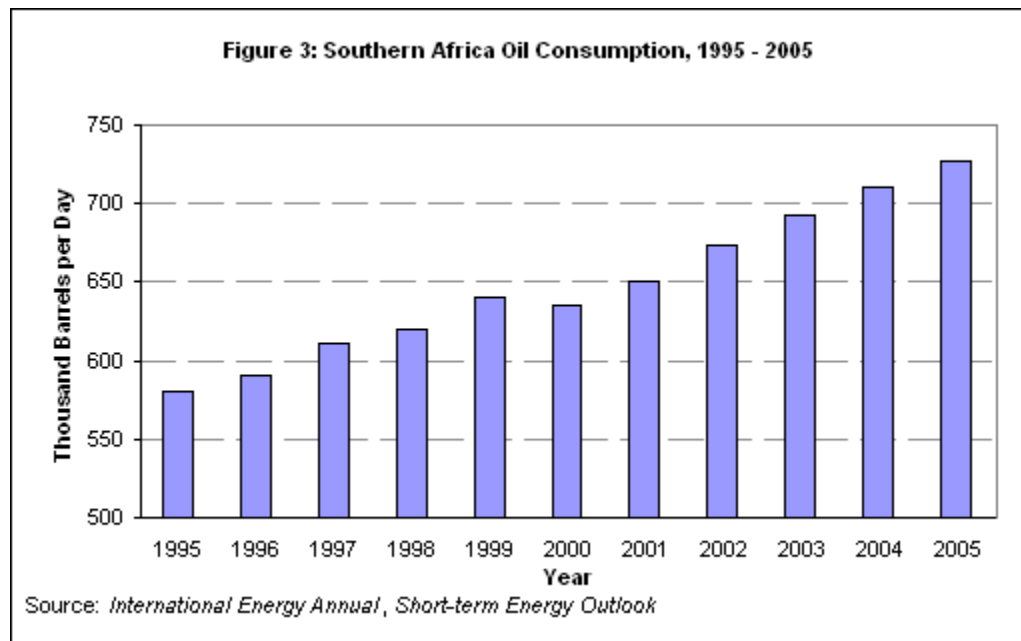
In accordance with Black Economic Empowerment (BEE) policy, in which, black people have ownership in new and existing business, Shell is expected to sell a 25 percent stake in the South African Sapref refinery to a black-owned partner. In addition to Shell and BP, multinationals Caltex (Chevron), Engen, and Total are major participants in South Africa's downstream petroleum markets. Several domestic firms are also involved, including black-owned firms Naledi Petroleum and Afric Oil. Worldwide Africa Investment Holdings (WAIH) owns 55 percent of Afric Oil, 51 percent of South African Zenex, and 20 percent of Engen.

In addition to the Luanda refinery, Angola is developing plans for a new 200,000-bbl/d refinery in the coastal city of Lobito. An estimated 50 percent of the products produced at the new refinery would be consumed domestically; the remaining 50 percent would be for export. Various firms have expressed interest in partnering with Sonangol in building the refinery, especially after Sonangol linked building the refinery to having upstream ownership in Blocks 15, 17 and 18. Sonangol hopes to have the refinery operational by 2009.

Zambia's Indeni refinery is currently operating at 80 percent capacity after having been closed due to mechanical problems. Over the next three years, a total of \$65 million will go towards refinery upgrades of Indeni. In August 2006, Indeni is slated to undergo the first phase of refinery upgrades, which will cost \$24 million. Meanwhile, Zambia will be forced to import refined fuel from South Africa, Tanzania and Mozambique to supply the country's economically vital copper and cobalt mines and transport sector. Indeni is jointly owned by the Zambian government and Total.

Consumption

In 2005, petroleum consumption in Southern Africa averaged 727,000 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. However, in May 2006, Equatorial Guinea agreed to supply Zimbabwe with oil, which should ameliorate the country's struggling economy.



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 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.

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 there.

Pipelines

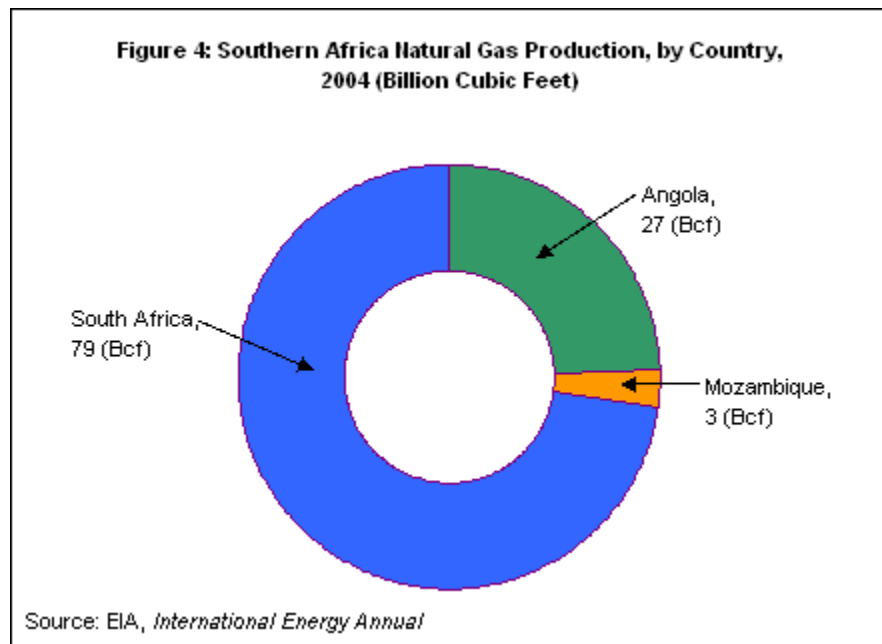
The 1,069-mile Tazama Pipeline transports crude from Dar es Salaam, Tanzania to Zambia's Indeni refinery. The pipeline, jointly owned by the governments of Zambia (67 percent) and Tanzania (33 percent), has a capacity of 22,000 bbl/d. In October 2004, the Zambian government decided not to privatize the Tazama Pipeline due to the facility's strategic importance to the national economy. Serious problems facing the Tazama Pipeline include vandalism and the deterioration of pumping equipment.

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 80 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 oil demand.

Natural Gas

According to the OGJ, SADC contains 9.2 Trillion cubic feet (Tcf) of proven natural gas reserves. The majority of the proven reserves are located in Angola (1.6 Tcf), Mozambique (4.5 Tcf), Namibia (2.2 Tcf), Tanzania, with 800 Billion cubic feet (Bcf) and DRC (35 Bcf) (see [Table 4](#)). Overall, the region contains approximately 1.9 percent of Africa's natural gas reserves. Several projects are underway to expand utilization of natural gas in the region.

SADC contains relatively small amounts of proven natural gas reserves when compared to the rest of the African continent.



Angola

In Angola, Chevron and Sonangol are developing a liquefied natural gas (LNG) facility to convert natural gas from several offshore fields for export. The facility will process natural gas that is currently flared during crude oil production. The LNG facility will have total production capacity of five million-tonnes-per-year and will be located near the city of Soyo, in northern Angola. The front-end engineering and design study (FEED) for the LNG project should be completed by 2007; however, the facility is not expected to come online before 2010 at an estimated cost of \$5 billion. Chevron and Sonangol are the principal stakeholders in the LNG project, joined by partners Norsk Hydro, BP, Total and ExxonMobil.

Namibia

In Namibia, Tullow Oil (U.K.) is developing the Kudu natural gas field, which is located offshore in Production License 001 and has estimated proven reserves of 1.3 Tcf. The project includes piping natural gas to an 800-megawatt (MW) power plant at Oranjemund, which Namibia's state electric company, NamPower, is currently developing. Tullow has plans to drill two appraisal wells on Kudu in early 2007. Tullow operates Kudu with a 90 percent share in the project and is joined by the National Petroleum Corporation of Namibia (10 percent).

Tanzania

Tanzania's Songo Songo natural gas field is located offshore in the Indian Ocean and contains estimated proven reserves of 420 Bcf and additional probable reserves of 85 Bcf. The five wells on the field can produce at a capacity of 1.5 million cubic feet per day (Mmcf/d). However, current marine and land pipeline infrastructure only allows for 70 Mmcf/d of natural gas to be supplied to industrial users in Dar es Salaam. Songo Songo is operated by East Coast Energy Corporation. In April 2006, Canadian-based Artumus Group began drilling appraisal wells in Tanzania's Mnazi Bay. Analysts estimate that the field could produce 10 MMcf/d over a 30-year project life. Tanzania awarded Artumas the license for the Mnazi Bay Block in 2004.

Mozambique

Mozambique has 2.5 Tcf of proven natural gas reserves located offshore in the Temane, Pande and Buzi-Divinhe fields. In 2004, Sasol began piping natural gas from the Temane and Pande fields through a 537-mile, \$1.2 million pipeline. To date this is Mozambique's only source of hydrocarbon production; however, exploration for additional natural gas reserves in the country continues. In June 2005, Sasol signed an exploration and production contract for Blocks 16 and 19 offshore Mozambique.

Botswana

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. In August 2005, production of the CBM pilot project began at the Lephephe

coal field. The area contains an estimated 12.8 Tcf of CBM. Additional studies of the Kalahari Karoo basin by Advanced Resources International have found that the area could contain a total of 196 Tcf of gas-in-place resources, of which, 40 Tcf could be recoverable.

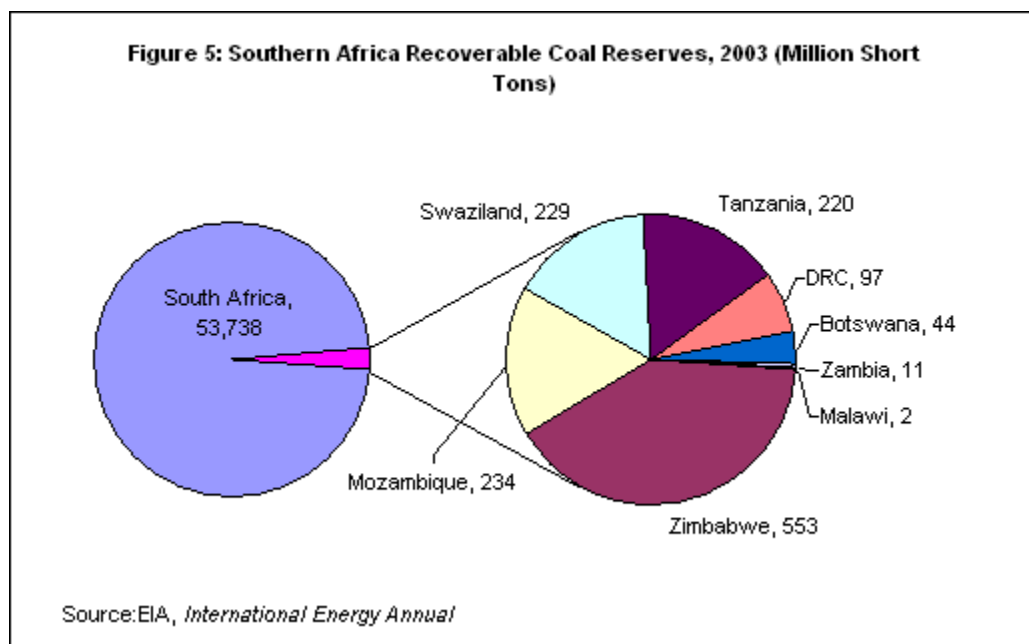
South Africa

In 2000, a natural gas discovery was made in Block 2A in South Africa, which is likely part of the reservoir that extends to Namibia's Kudu prospect. US-based companies Forest Oil Corporation (operator) and Anschutz, along with BEE Company Mvelaphanda, are in the process of exploring for additional natural gas in Block 2A. In August 2003, PetroSA purchased a 30 percent share in the Ibhubezi Gas Field project. PetroSA hopes that natural gas from Ibhubezi, along with natural gas from Namibia and Mozambique, can be used at its 45,000 bbl/d Mossel Bay gas-to-liquids (GTL) plant, where reserves may be depleted by 2007.

Coal

The largest recoverable coal reserves in SADC are located in South Africa.

Coal resources are abundant in SADC, especially in South Africa, where in 2003, recoverable reserves were estimated at 53.7 billion short tons (5.4 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 (98 percent) of the region's coal in 2003. Coal is primarily used in the production of electricity in the SADC region. However, South Africa has a highly developed synthetic fuels industry, in which, the country uses large amounts of coal along with natural gas and condensate to produce oil.



South Africa

South Africa is the world's sixth largest coal producer. The Mpumalanga province accounts for 83 percent of South African coal production, while Free State, Limpopo, and KwaZulu-Natal also have producing mines. Anglo American's Anglo Coal (Anglo), BHP Billington's Ingwe Coal (Ingwe), domestic mining firms Eyesizwe Coal (Eyesizwe), Kumba Resources (Kumba), Sasol Mining (Sasol), and Swiss-based Xstrata Coal South Africa (XCSA) are all responsible for the majority of South Africa's coal production. For more information on coal sector in South Africa please see the [South African Country Analysis Brief](#).

Mozambique

Mozambique awarded Companhia do Vale do Rio Doce (CVRD) the rights to develop coal deposits in the 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. In May 2006, CVRD announced that it planned to submit a proposal to its executive board to begin work on the Moatize mines. 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.

Malawi

Despite reserves of approximately 2.3 Mmst, Malawi's Mchenga coal mine continues to produce below peak output due to financial constraints. Mchenga Coal Mines has been searching for additional reserves in the northern Livingstonia coalfields. According to the Ministry of Natural Resources and Environmental Affairs of Malawi the unexploited Mwabvi coalfield in the southern Shire River valley contains proven reserves of 5.5 Mmst, while the Lengwe coalfield contains probable reserves of 11 Mmst.

Zimbabwe

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 September 2005, Rio Tinto Zimbabwe (RioZim) sought investments for the stalled Sengwa coal project. An estimated \$2 million is needed to continue work on the project. According to RioZim, the area could have 2.2 billion short tons of coal reserves.

Botswana

In Botswana, Meepong Resources (a subsidiary of CIC Energy) has ownership rights to the Mmamabula east and Mmamabula south coal prospecting licenses. However, Highlands Star Group (HSG) is seeking an 80 percent shareholding interest in Meepong Resources, which would give them majority ownership. The Botswana Ministry of Minerals and Energy estimates that Mmamabula contains proven coal reserves of 4.7 Mmst. CIC has plans to develop a coal-fired power station, which would supply electricity to the Southern African power grid beginning in 2011, or to supply thermal coal from the mine to power producers already producing electricity.

Electricity

South Africa generates the vast majority of electricity in SADC.

As of January 1, 2003, SADC's total installed electric generating capacity was 52.3 gigawatts (GW) (see [Table 6](#)). South Africa generates the majority of the region's electricity, with 215.9 Billion kilowatthours (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).

Regional Projects

Created in 1995, the Southern African Power Pool (SAPP) aims to provide reliable and economical electricity to consumers of each member-country. A total of 12 member-countries belong to SAPP and they are represented by their respective electric power companies. The electric power companies have equal rights and obligations, and they have agreed to act in solidarity as they work to provide electricity throughout SADC. The coordination center for SAPP is located in Harare, Zimbabwe.

In November 2003, BPC, Eskom, ENE, NamPower and SNEL formed the Western Corridor Power Project (Westcor) in order to provide electricity to promote 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: DRC, Angola, Namibia, Botswana, and South Africa. 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. As of January 2006, the participating governments and utilities had signed agreements to co-develop the project, and each utility committed \$100,000 for funding feasibility studies. The utility companies also signed a shareholders agreement, in which, each utility agreed to own 20 percent of Westcor. The Western Power Project may eventually include the construction of hydropower stations in Angola and Namibia.

South Africa

South Africa's parastatal company Eskom is one of the largest electric utilities in the world and generates 95 percent of the country's electricity. Eskom has 36,200 megawatts (MW) of net generating capacity, which is primarily coal-fired (32,100 MW). In addition, Eskom operates one nuclear power station at Koeberg (1,800 MW), two natural gas turbine facilities (340 MW), six conventional hydroelectric plants (600 MW), and two hydroelectric pumped-storage stations (1,400 MW). Eskom produces adequate electricity for domestic use and exports surplus power to Botswana, Lesotho, Mozambique, Namibia, Swaziland, and Zimbabwe. Given the prospect of reaching its peak capacity in 2007, Eskom announced in June 2004 a plan to bring its three mothballed power stations (3,800 MW) back into service by 2011. Additional electricity is generated by South African municipalities (2,400 MW) and private companies (800 MW).

Mozambique

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). However, in March 2006, the government of Mozambique reached an agreement with Portugal in which majority ownership of Cahora Bassa will be transferred to Mozambique. 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.

Zimbabwe

While Zimbabwe imports about 40 percent of its electricity requirements, the country's power supply has grown increasingly irregular over the past year. As of May 2006, Zimbabwe had an electricity deficit of roughly 250 MW per day. The lack of electricity is due to underperformance of the Kariba and Hwange hydroelectric power stations. In response, the Zimbabwe Electricity Supply Authority (ZESA) has been forced to introduce load shedding and occasional power cuts, while increasing electricity imports from South Africa, Mozambique and DRC. ZESA has asked the Reserve Bank of Zimbabwe (RBZ) for \$900 million in funding to refurbish and expand Kariba and Hwange. In October 2005, a \$200 million refurbishment project for Kariba South failed due to lack of funding.

Zambia

Zambia has abundant hydroelectric resources and meets most of its domestic 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 2006, Zesco announced that it had completed rehabilitation work on Zambia's power transmission and distribution systems; however, rehabilitation of the country's hydroelectric power stations is not expected to be completed until 2007. Zambia is currently seeking funding for building three new power projects, which include the Kafue Gorge Lower Project, Kariba North Bank Extension, and the Itzhi-tezhi Hydropower Project.

Democratic Republic of Congo

DRC has extensive potential hydroelectric capacity of approximately 100,000 MW. Due to continuing political uncertainties and the resulting lack of investor interest, only a fraction of this amount has been developed. In 2003, the DRC had total installed generating capacity of 2,568 MW. However, actual production is estimated at no more than 600-700 MW because two-thirds of the turbines are not functioning. In May 2006, MagEnergy (Canada) began overseeing the refurbishment and rehabilitation work on Inga Dam, which is operating at 40 percent. The repairs should allow Inga to work at full capacity (1,774 MW) by 2010. 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 Southern African Power Pool (SAPP) grid.

Malawi

Malawi's Shire River supports four hydroelectric plants, which account for the majority of the country's electrical output. A 31-mile transmission line from Mozambique's Cahora Bassa Dam is under construction and is expected to be completed by 2008. Additional work continues on the Kapichira hydroelectric power scheme that is designed to add 128 MW to the country's capacity.

Swaziland

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. In early 2006, the hydroelectric station at Maguga Dam came online; however, maximum output is only 19 MW. Even with the new power station at Maguga, Swaziland still imports about 80 percent of the country's electricity from South Africa, and additional amounts from Mozambique.

Botswana

Botswana plans to provide electricity to 70 percent of its population by March 2009 and to the

remaining 30 percent 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. Through government funding, BPC is engaged in a major program to extend the electricity grid into rural areas. In early 2004, BPC completed the largest electricity extension phase to date.

Namibia

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 a proposed 800-MW natural gas-fired power plant (supplied by the Kudu field), 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 pre-feasibility study on a 20-MW hydroelectric plant at Popa Falls on the Okavango River. Officials rejected an earlier plan 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, but the project remains in limbo. Namibia already imports electricity from Zambia via a 66-KV line, but the countries have plans to construct a higher voltage power line between Katima Mulillo and Victoria Falls at some point in the future. The line could be connected to Namibia's national grid.

Tanzania

After a drought in 2004, all of Tanzania's hydroelectric plants were operating at half capacity, which led to the implementation of a World Bank-funded Emergency Power Plan. In July 2004, Houston-based Globeleq brought online the 110-MW gas-powered Songas plant in Ubungu, which the company expanded to 180 MW in June 2005. The Songas plant supplies approximately 35 percent of Tanzania's energy requirements. Tanzania, Zambia 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.

Renewable Energy

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 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.

Solar energy is viewed as a prime tool for SADC'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 Training and Research Center inaugurated the Gobabeb hybrid mini-grid installation in the Namib Desert.

Tables

Table 1: Economic and Demographic Indicators

Country	Gross Domestic Product (GDP), 2005E (Billions of U.S. \$)	Real GDP Growth Rate, 2005E (percent)	Real GDP Growth Rate, 2006F (percent)	Per Capita GDP, 2005E	Population 2005E (millions)
Angola	\$26.0	15.9	27.3	\$1,734	15.2
Botswana	\$9.0	4.8	5.0	\$4,944	1.7
Comoros	\$0.4	2.8	3.1	\$724	0.6
Democratic Republic					

of Congo	\$5.5	6.8	6.5	\$97	56.4
Lesotho	\$1.4	3.2	3.1	\$664	2.2
Madagascar	\$4.0	5.5	6.5	\$223	17.8
Malawi	\$2.5	2.0	5.5	\$215	11.4
Mauritius	\$6.3	3.0	2.6	\$5,149	1.2
Mozambique	\$6.0	7.7	7.5	\$304	19.5
Namibia	\$5.0	3.8	3.7	\$2,505	1.9
Seychelles	\$0.7	1.0	2.6	\$8,153	0.1
South Africa	\$239.4	4.9	4.5	\$5,093	47.0
Swaziland	\$2.0	1.8	2.0	\$1,763	1.2
Tanzania	\$12.0	6.8	5.7	\$284	43.3
Zambia	\$7.0	4.3	6.0	\$661	10.9
Zimbabwe	\$2.9	-10.3	-5.2	\$218	13.3
Regional Total/Weighted Average	330.1	5.7	6.3	\$4,171	243.7

Source: Global Insight

Table 2: Total Energy and Carbon Dioxide Emissions, 2003

Country	Total Energy Consumption, (Quadrillion Btu)	Total Energy Production, (Quadrillion Btu)	Net Energy Exports, (Quadrillion Btu)	Carbon Dioxide Emissions (Million metric tons of CO ₂)
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	0.111	0.031	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
Regional Total	5.919	8.475	2.556	126.33

Sources: *International Energy Annual*, EIA

Table 3: Petroleum Overview

Country	Petroleum Production, 2005 (Thousand Barrels Per Day)	Petroleum Consumption, 2005 (Thousand Barrels Per Day)	Net Petroleum Exports, 2005 (Thousand Barrels Per Day)	Crude Oil Reserves, 1/1/2006 (Million Barrels)	Crude Oil Refining Capacity, 1/1/2006 (Thousand Barrels Per Day)

Angola	1,250.2	58.0	1,192.2	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	19.7	6.0	13.7	187.0	0.0
Lesotho	0.0	1.0	-1.0	0.0	0.0
Madagascar	0.0	19.0	-19.0	0.0	0.0
Malawi	0.0	6.0	-6.0	0.0	0.0
Mauritius	0.0	23.0	-23.0	0.0	0.0
Mozambique	0.0	13.0	-13.0	0.0	0.0
Namibia	0.0	21.0	-21.0	0.0	0.0
Seychelles	0.0	10.0	-10.0	0.0	0.0
South Africa	214.9	496.0	-281.1	15.7	504.5
Swaziland	0.0	3.0	-3.0	0.0	0.0
Tanzania	0.0	25.0	-22.0	0.0	14.9
Zambia	0.1	12.0	-11.9	0.0	23.8
Zimbabwe	0.0	20.0	-20.0	0.0	0.0
Regional Total	1,484.9	727.0	760.9	5,614.7	582.2

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

Table 4: Natural Gas Overview (Billion Cubic Feet)

Country	Production, 2004	Consumption, 2004	Reserves 1/1/2006
Angola	26.5	26.5	1,620
Botswana	0.0	0.0	0
Comoros	0.0	0.0	0
Democratic Republic of Congo	0.0	0.0	35
Lesotho	0.0	0.0	0
Madagascar	0.0	0.0	0
Malawi	0.0	0.0	0
Mauritius	0.0	0.0	0
Mozambique	2.8	2.8	4,500
Namibia	0.0	0.0	2,200
Seychelles	0.0	0.0	0
South Africa	78.8	78.8	1
Swaziland	0.0	0.0	0
Tanzania	0.0	0.0	800
Zambia	0.0	0.0	0
Zimbabwe	0.0	0.0	0
Regional Total	108.1	108.1	9,156

Sources: *International Energy Annual, EIA, Oil and Gas Journal*

Table 5: Coal Overview (Million Short Tons)

Country	Production, 2003	Consumption, 2003	Reserves
Angola	0.00	0.00	0.0
Botswana	0.99	1.02	44.0

Comoros	0.00	0.00	0.0
Democratic Republic of Congo	0.11	0.26	97.0
Lesotho	0.00	0.00	0.0
Madagascar	0.00	0.01	0.0
Malawi	0.00	0.02	2.2
Mauritius	0.00	0.32	0.0
Mozambique	0.05	0.01	233.7
Namibia	0.00	0.00	0.0
Seychelles	0.00	0.00	0.0
South Africa	263.78	187.76	53,737.7
Swaziland	0.41	0.41	229.3
Tanzania	0.09	0.09	220.5
Zambia	0.22	0.21	11.0
Zimbabwe	3.74	3.53	553.4
Regional Total	269.39	193.64	55,128.7
Sources: <i>International Energy Annual, EIA</i>			

Table 6: Electricity Overview, Billion Kilowatthours except where noted					
Country	Consumption, 2003	Generation, 2003	Installed Capacity, 1/1/2003 (gigawatts)	Exports, 2003	Imports, 2003
Angola	1.78	1.92	0.67	0.00	0.00
Botswana	2.26	0.94	0.13	0.00	1.39
Comoros	0.02	0.02	0.01	0.00	0.00
Democratic Republic of Congo	4.32	6.04	2.57	1.30	0.01
Lesotho	0.36	0.35	0.08	0.00	0.04
Madagascar	0.77	0.83	0.29	0.00	0.00
Malawi	1.21	1.30	0.30	0.00	0.00
Mauritius	1.81	1.94	0.67	0.00	0.00
Mozambique	10.46	15.14	2.34	9.50	5.88
Namibia	2.37	1.46	0.00	0.06	1.07
Seychelles	0.22	0.24	0.03	0.00	0.00
South Africa	197.37	215.88	40.48	10.14	6.74
Swaziland	1.16	0.39	0.13	0.00	0.80
Tanzania	2.96	3.15	0.86	0.00	0.03
Zambia	5.76	8.35	1.79	2.00	0.00
Zimbabwe	11.56	8.88	1.96	0.00	3.30
Regional Total	244.39	266.83	52.31	23.00	19.26
Sources: <i>International Energy Annual, EIA</i>					

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