

## COUNTRY ANALYSIS BRIEFS

# Sudan

Last Updated: April 2007

### Background

**Revenues from Sudan's increasing hydrocarbon exports represent 70 percent of the country's total export revenues.**

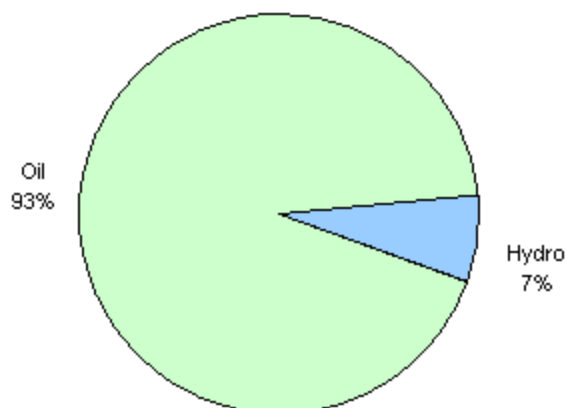
Sudan is developing its significant hydrocarbon resources. The country's oil exports, which have increased sharply since the completion of a major oil-export pipeline in 1999, account for 70 percent of total export revenues. Additional growth in Sudan's hydrocarbon sector will likely occur with a refurbished infrastructure, which has seen little improvement since the beginning of the country's civil conflicts in 1955. As of January 2007, according to the Sudanese Minister of State for Energy and Mines, Sudan is considering joining the Organization of Petroleum Exporting Countries (OPEC) at some point in the future.

In January 2005, the Sudanese government in Khartoum and the Sudan People's Liberation Army (SPLA) in the south signed the Comprehensive Peace Agreement (CPA), which ended 21-years of civil war. Prior to the signing, several important issues were agreed upon by the two parties including the sharing of oil revenues (50:50). Also in 2005, President Bashir formed a border commission tasked with defining the border between northern and southern Sudan, in accordance to the CPA. Much of Sudan's oil producing region lies in the disputed border area.



In 2004, Sudan's energy consumption mix was dominated by oil (93 percent), with the remainder coming from hydroelectricity (7 percent). Natural gas, coal, nuclear and other renewables are currently not part of the country's energy consumption mix. Between 1984-2004, the share of oil in Sudan's energy mix increased from 86 percent to 93 percent. Hydroelectricity consumption experienced a decrease, during the same time period, from 14 percent to 7 percent.

### Total Energy Consumption in Sudan, by Type (2004)



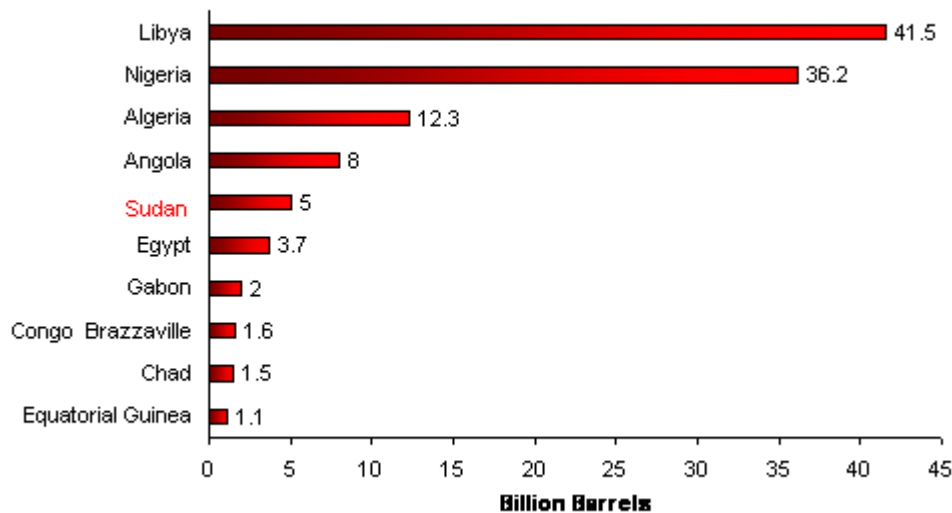
Source: EIA International Energy Annual 2004

## Oil

**Sudan is becoming a significant world oil producer.**

According to *Oil and Gas Journal (OGJ)*, Sudan contained proven oil reserves of five billion barrels as of January 2007 up from an estimated 563 million barrels of proven oil reserves in 2006. The majority of proven reserves are located in the south in the Muglad and Melut basins. Due to civil conflict, oil exploration has mostly been limited to the central and south-central regions of the country. It is estimated that vast potential reserves are held in northwest Sudan, the Blue Nile basin, and the Red Sea area in eastern Sudan.

### Top African Proven Oil Reserve Holders, 2007



Source: *Oil and Gas Journal 2007*

### Sector Organization

The Sudan National Petroleum Corporation (Sudapet) is active in Sudan's oil exploration and production. However, due to its limited technical and financial resources, Sudapet often develops joint ventures with foreign companies in oil projects. Foreign companies involved in Sudan's oil sector are primarily from Asia. They are led by the China National Petroleum Corporation (CNPC), India's Oil and Natural Gas Corporation (ONGC) and Malaysia's Petronas.

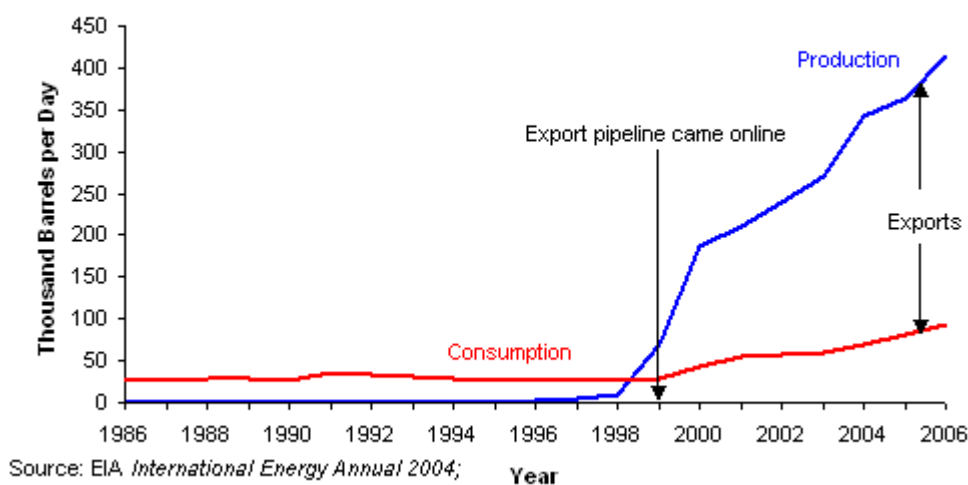
In October 2005, Sudan established the National Petroleum Commission (NPC) to bolster the

development of the country's oil resources. To accomplish its mission, NPC allocates new oil contracts, and it ensures an equal sharing of oil revenues between the national government in Khartoum and the Government of South Sudan (GoSS). In addition, NPC is responsible for resolving duplicate oil contract issues in which the GoSS has allocated contracts overlapping contracts previously granted by Khartoum. NPC is currently scrutinizing duplicate contracts given to Total and White Nile Ltd. over Block B and the White Nile Petroleum Operation Company (WNPOC) and Ascom Group of Moldavia over Block 5b. President Bashir is believed to co-chair the NPC with Vice-President Salva Kiir, who also heads the GoSS.

### Exploration and Production

Oil production has risen steadily since the July 1999 completion of an export pipeline that runs from central Sudan to the Port of Sudan. In 2006, crude oil production averaged 414,000 barrels per day (bbl/d), up from 363,000 bbl/d in 2005. According to Angelina Tany, Minister of State for Mines and Energy, Sudan plans to be producing one million bbl/d of crude oil by the end of 2008.

**Sudan's Oil Production and Consumption, 1986-2006**



### Greater Nile Oil Project

In 1996, Canadian independent Arakis Energy (Arakis) began development of the Heglig and Unity fields (Blocks 1, 2, and 4), which contain estimated recoverable reserves of 600 million - 1.2 billion barrels of oil. Because the fields are not located near the Red Sea coast, Arakis entered into a consortium with the Greater Nile Petroleum Operating Company (GNPOC) to raise investment for a 994-mile pipeline from the fields to the Suakim oil terminal near Port Sudan. In September 1999, the first cargo of crude departed the export terminal. Although GNPOC originally constructed the pipeline with throughput of 150,000 bbl/d, its has since been increased to 300,000 bbl/d, while maximum capacity is estimated at 450,000 bbl/d. As of January 2007, combined production from Blocks 1, 2, and 4 was estimated at 260,000 bbl/d. The GNPOC joint venture is operated by CNPC (40 percent), with partners Petronas (30 percent), ONGC (25 percent) and Sudapet (5 percent).

### Blocks 3 and 7

In June 2004, Petrodar, a consortium of CNPC (41 percent), Petronas (40 percent), Sudapet (8 percent), Gulf Oil Petroleum (6 percent), and the Al-Thani Corporation (5 percent) awarded a \$239 million contract to Malaysia's Ranhill International and Sudan's Petroneeds Services International for development work on Blocks 3 and 7. The blocks contain the Adar Yale and Palogue oil fields, with estimated recoverable reserves of 460 million barrels. As of January 2007, Blocks 3 and 7 combined produced an estimated 165,000 bbl/d of oil. The fields could reach peak production of 200,000 bbl/d by late 2007. In November 2005, CNPC brought online the Petrodar pipeline linking the two blocks to Port Sudan. The pipeline has current throughput of 150,000 bbl/d and maximum capacity of 500,000 bbl/d. The project also includes a 300,000 bbl/d central processing facility at Al-Jabalayan and production facilities at Palogue.

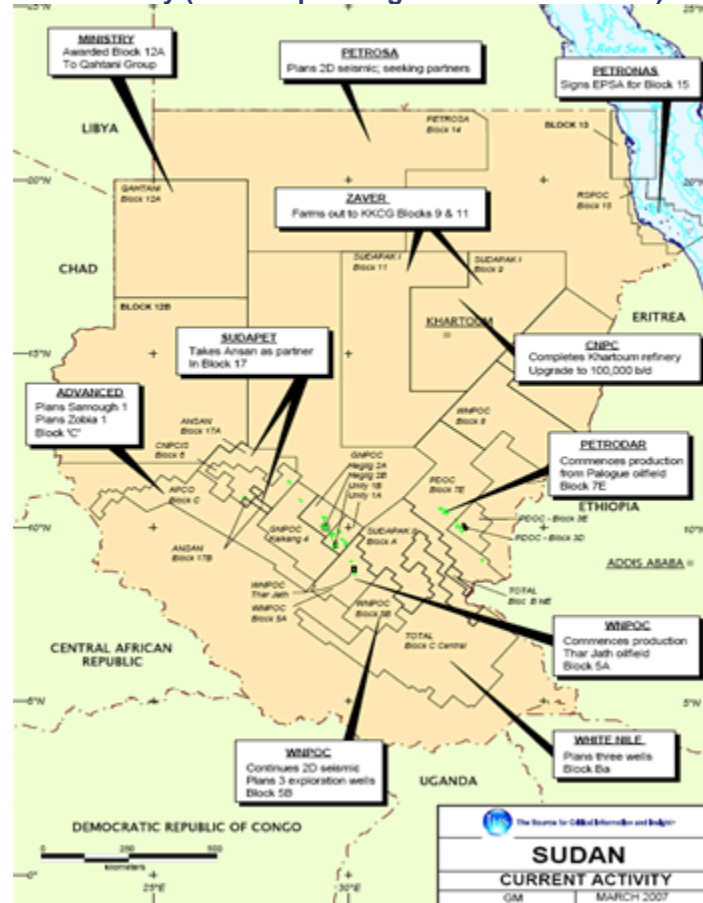
### Block 5a

In April 2005, the Sudanese government signed an agreement with WNPOC for the development of the Thar Jath and Mala fields on Block 5A. First oil from the block came online in June 2006 at an initial rate of 38,000 bbl/d. As of March 2007, the field was still producing at 38,000 bbl/d, while full capacity is estimated at 60,000 bbl/d. Oil from the field flows through a 110-mile pipeline to Port Sudan. WNPOC is a consortium of companies, which include Petronas (68.875 percent and operator), ONGC (23.125 percent) and Sudapet (8 percent).

### Block 6

In November 2004, CNPC brought online its Fula field on Block 6 at a rate of 10,000 bbl/d. Current output on the block is 40,000 bbl/d, but is expected to eventually reach 80,000 bbl/d. CNPC has constructed a pipeline that links the Fula field to the Khartoum refinery.

### Map: Sudan recent activity (click map for high resolution version)



Source: IHS Energy GEPS Reports

Exploration and development of Sudan's oil resources has been controversial. International human rights organizations have accused the Sudanese government of financing human rights abuses with oil revenues, including the mass displacement of civilians near the oil fields. Factional fighting in the South and rebel attacks on oil infrastructure have kept oil production and exploration from reaching full potential to date. In October 2004, for example, the Sudanese government prevented a militia attempt to sabotage the country's main oil export pipeline. However, the 2005 Comprehensive Peace Agreement (CPA) between the northern government in Khartoum and the GoSS could facilitate additional investment in both production facilities and new exploration initiatives in Sudan. In January 2005, after the official signing of the CPA, IOCs including Total, Marathon Oil Corporation, and the Kuwait Foreign Petroleum Exploration Company (KFPEC) renewed their exploration rights in southern Sudan.

### Exports

In 2006, Sudan consumed 94,000 bbl/d and exported approximately 320,000 bbl/d of crude oil,

with the majority of crude destined for Asian markets. According official trade statistics as reported to the Global Trade, Sudan shipped 124,000 bbl/d of its crude exports to Japan in 2006. China also imported a significant portion of Sudanese crude exports in 2006 averaging 99,000 bbl/d. Additional importers of Sudanese crude include South Korea, Indonesia, and India. According to the *International Crude Oil Market Handbook*, Sudan's "Nile" export crude blend is considered sweet and light, having a gravity of 33 degrees API and a low sulfur content of 0.045 percent.

### Refining and Downstream

According to OGJ, Sudan's refineries in Khartoum and Port Sudan had total combined refining capacity of 121,700 bbl/d as of January 2007. In July 2006, CNPC announced the completion of the Khartoum refinery expansion project, which doubled the refinery's capacity from 50,000 bb/d to 100,000 bbl/d. The Khartoum refinery processes Nile blend crude, which has a low sulfur content and high fuel-yield. The additional refinery capacity from the expansion should help alleviate the short supply of refined products available in Sudan, while giving the country some additional export capacity.

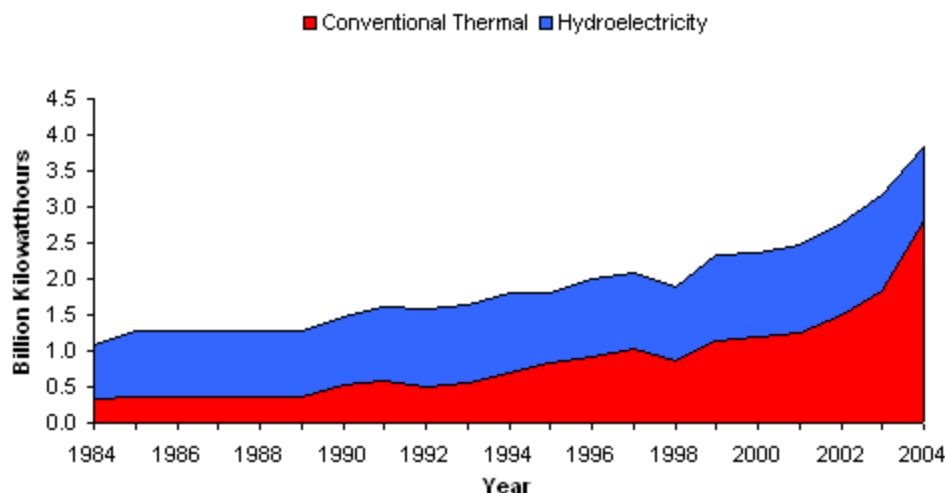
The Port Sudan facility is located near the Red Sea and is Sudan's smallest refinery, with capacity of 21,700 bbl/d. In September 2005, a contract was awarded to Petronas to build a new refinery at Port Sudan. The refinery will be designed to process Dar blend crude, which has high-acid content and is found in Sudan's Melut basin. The refinery will have capacity of 100,000 bbl/d and could be operational in 2009. Petronas is joined with the Sudanese Ministry of Energy and Mining in a 50:50 partnership in the project.

## Electricity

**Sudan generates the majority of electricity by conventional thermal sources.**

In 2004, Sudan had 760 megawatts (MW) of electricity generation capacity. Sudan generated 3.8 billion kilowatthours (Bkwh) of electricity in 2004, and consumed 3.6 Bkwh. The majority of electricity in Sudan is generated by conventional thermal sources (76 percent), with the remainder coming from hydroelectricity (24 percent). The country's main hydroelectricity generating facility is the 280-MW Roseires dam located on the Blue Nile river basin, approximately 315 miles southeast of Khartoum. The facility has frequently been attacked by rebel groups, and low water levels often cause its capacity to fall to 100 MW.

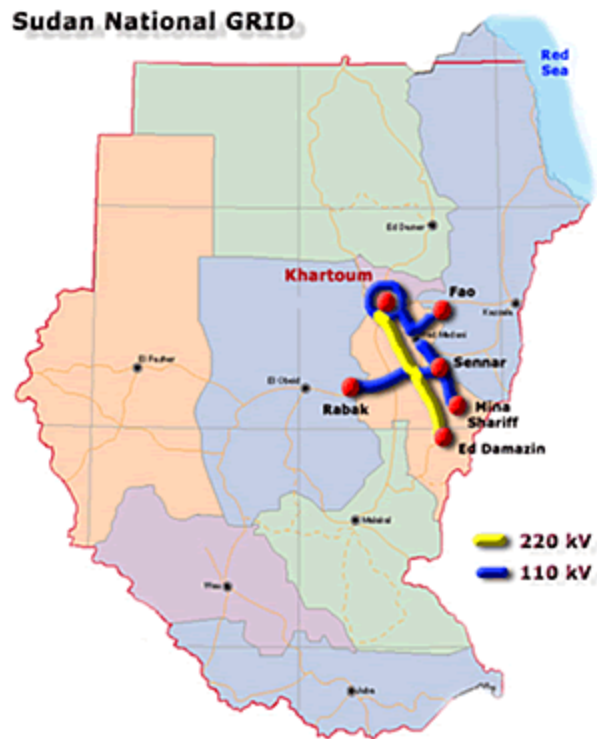
**Sudan's Electricity Generation, by Source, 1984-2004**



Source: International Energy Annual, 2004

### Sector Organization

State-owned National Electricity Corporation (NEC) is responsible for electricity generation, transmission and distribution in Sudan. NEC transmits electricity through two interconnected electrical grids, the Blue Nile Grid and the Western grid, which cover only a small portion of the country. Regions not covered by the grid often rely on small diesel-fired generators for power. Only 30 percent of the population currently has access to electricity, but the government hopes to increase that figure to 90 percent in coming years.



Source: National Electricity Corporation

## Profile

### Country Overview

<b>President</b>	Umar Hassan Ahmad al-Bashir (since 1993)
<b>Location</b>	Northern Africa, bordering the Red Sea, between Egypt and Eritrea
<b>Independence</b>	1 January 1956 (from Egypt and UK)
<b>Population (2006E)</b>	41,236,378

### Economic Overview

<b>Minister of Finance</b>	Zubeir Mohammed Hassan
<b>Currency/Exchange Rate (4/13/07)</b>	1 Sudanese Dinar (SDD) = 0.0043 USD
<b>Inflation Rate</b>	(2005E):8.5% (2006E): 7.2%
<b>Gross Domestic Product (2006E)</b>	\$36.5 Billion
<b>Real GDP Growth Rate</b>	(2005E): 7.9% (2006E): 9.0%
<b>External Debt (2006E)</b>	\$29.7 Billion
<b>Exports (2006E)</b>	\$5.9 Billion
<b>Exports</b>	oil and petroleum products; cotton, sesame, livestock, groundnuts, gum arabic, sugar
<b>Exports - Partners (2005E)</b>	China 71.1%, Japan 12%, Saudi Arabia 2.8%
<b>Imports (2006E)</b>	\$7.6 Billion
<b>Imports</b>	foodstuffs, manufactured goods, refinery and transport equipment, medicines and chemicals, textiles, wheat
<b>Imports - Partners (2005E)</b>	China 20.7%, Saudi Arabia 9.4%, UAE 5.9%, Egypt 5.5%, Japan 5.1%, India 4.8%
<b>Current Account Balance (2006E)</b>	-\$3.9 Billion

### Energy Overview



<b>Minister of Energy and Mining</b>	Awad Ahmed al-Jaz
<b>Proven Oil Reserves (January 1, 2007E)</b>	5 billion barrels
<b>Oil Production (2006E)</b>	414 thousand barrels per day
<b>Oil Consumption (2006E)</b>	94 thousand barrels per day
<b>Crude Oil Refining Capacity (2007E)</b>	121.7 thousand barrels per day
<b>Proven Natural Gas Reserves (January 1, 2007E)</b>	3 trillion cubic feet
<b>Natural Gas Production (2004E)</b>	None
<b>Natural Gas Consumption (2004E)</b>	None
<b>Recoverable Coal Reserves (2003E)</b>	None
<b>Coal Production (2004E)</b>	None
<b>Coal Consumption (2004E)</b>	None
<b>Electricity Installed Capacity (2004E)</b>	0.8 gigawatts
<b>Electricity Production (2004E)</b>	3.8 billion kilowatt hours
<b>Electricity Consumption (2004E)</b>	3.6 billion kilowatt hours
<b>Total Energy Consumption (2004E)</b>	0.1 quadrillion Btus*, of which Oil (93%), Hydroelectricity (7%), Natural Gas (0%), Coal (0%), Nuclear (0%), Other Renewables (0%)
<b>Total Per Capita Energy Consumption ((Million Btu)E)</b>	3.8 million Btus
<b>Energy Intensity (2004E)</b>	2,651.4 Btu per \$2000-PPP**

## Environmental Overview

<b>Energy-Related Carbon Dioxide Emissions (2004E)</b>	9.8 million metric tons, of which Oil (100%), Natural Gas (0%), Coal (0%)
<b>Per-Capita, Energy-Related Carbon Dioxide Emissions ((Metric Tons of Carbon Dioxide)E)</b>	0.3 metric tons
<b>Carbon Dioxide Intensity (2004E)</b>	0.2 Metric tons per thousand \$2000-PPP**
<b>Environmental Issues</b>	inadequate supplies of potable water; wildlife populations threatened by excessive hunting; soil erosion; desertification; periodic drought
<b>Major Environmental Agreements</b>	party to: Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Law of the Sea, Ozone Layer Protection signed, but not ratified: none of the selected agreements

## Oil and Gas Industry

<b>Major Oil Ports</b>	Port Sudan
<b>Foreign Company Involvement</b>	China National Petroleum Corporation (CNPC), India's Oil and Natural Gas Corporation (ONGC) and Malaysia's Petronas, Total SA, Marathon Oil Corporation, and the Kuwait Foreign Petroleum Company
<b>Major Oil Fields</b>	Adar Yale, Fula, Heglig, Mala, Palogue, Thar Jath, and Unity
<b>Major Pipelines</b>	994-mile pipeline from Heglig and Unity fields to the Suakin oil terminal – 870-mile pipeline linking Melut Basin to oil export terminal near Port Sudan and a 110-mile pipeline linking the Thar Jath and Mala fields to Port Sudan.
<b>Major Refineries</b>	Khartoum (100,000 bbl/d), Port Sudan Refinery (21,700)

\* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.

\*\*GDP figures from OECD estimates based on purchasing power parity (PPP) exchange rates.

## Links

### EIA Links

[EIA - Country Information on Sudan](#)

**U.S. Government**

[CIA World Factbook - Sudan](#)

[USAID - Sudan](#)

[U.S. State Department Travel Warning - Sudan](#)

[U.S. State Department Consular Information Sheet - Sudan](#)

**General Information**

[Arab Net: Sudan](#)

[BBC Country Profile: Sudan](#)

[Darfur Information Center](#)

[Human Rights Watch: "Sudan, Oil and Human Rights"](#)

[Latest News from Sudan at Sudan.net](#)

[Sudan.Net](#)

[University of Pennsylvania African Studies: Sudan](#)

[Washington Post World Reference: Sudan](#)

**Foreign Government Agencies**

[Embassy of the Republic of Sudan](#)

**Electricity**

[National Electricity Corporation](#)

**Oil and Natural Gas**

[China National Petroleum Company \(CNPC\)](#)

[Oil and Natural Gas Corporation \(ONGC\)](#)

[Petronas](#)

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International Oil Daily

International Market Insight Reports

International Monetary Fund

MBendi

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Oil and Gas Journal

Panafrican News Agency

Petroleum Economist

Petroleum Intelligence Weekly

Platts Oilgram News

Reuters News Service

Suna News Agency

U.S. Energy Information Administration

Weekly Petroleum Argus

World Bank

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