



Country Analysis Brief: Sudan and South Sudan

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Overview

Table 1. Sudan's energy overview, 2021

	Crude oil and other petroleum liquids	Natural gas	Coal	Nuclear	Hydro	Renewables and other	Total
Primary energy consumption (quad)	0.27	0.00	0.00	0.00		0.09	0.36
Primary energy consumption (%)	75%	0%	0%	0%		25%	100%
Primary energy production (quad)	0.12	0.00	0.00	0.00		0.09	0.21
Primary energy production (%)	58%	0%	0%	0%		42%	0%
Electricity generation (TWh)		6.46	0.00	0.00	10.00	0.14	16.60
Electricity generation (%)		39%	0%	0%	60%	1%	100%

Data source: U.S. Energy Information Administration, International Energy Statistics database

Note: EIA aggregates hydroelectricity and renewables as *renewables and other* for primary energy production and consumption, and it aggregates crude oil and other petroleum liquids and natural gas as *fossil fuels* for electricity generation. Quad=quadrillion British thermal units, TWh=terawatthours

Table 2. South Sudan's energy overview, 2021

	Crude oil and other petroleum liquids	Natural gas	Coal	Nuclear	Hydro	Renewables and other	Total
Primary energy consumption (quad)	0.03	0.00	0.00	0.00		0.00	0.03
Primary energy consumption (%)	100%	0%	0%	0%		0%	100%
Primary energy production (quad)	0.29	0.00	0.00	0.00		0.00	0.29
Primary energy production (%)	100%	0%	0%	0%		0%	100%
Electricity generation (TWh)		0.56	0.00	0.00	0.00	0.01	0.57
Electricity generation (%)		98%	0%	0%	0%	2%	100%

Data source: U.S. Energy Information Administration, International Energy Statistics database

Note: EIA aggregates hydroelectricity and renewables as *renewables and other* for primary energy production and consumption, and it aggregates crude oil and other petroleum liquids and natural gas as *fossil fuels* for electricity generation. Quad=quadrillion British thermal units, TWh=terawatthours

- Sudan has had two civil wars since it gained independence in 1956. The second civil war ended in 2005 and led to the Comprehensive Peace Agreement (CPA) between the Sudanese government and the rebel factions in the southern region. The CPA established guidelines for oil revenue sharing and a timeframe to hold a referendum for independence of the South. The southern region overwhelmingly voted for secession, and in July 2011, South Sudan became an independent nation, separate from Sudan. The secession of South Sudan significantly affected Sudan's economy because Sudan lost 75% of its oil reserves to South Sudan. Sudan and South Sudan's oil sectors play a vital role in both economies and are closely linked to each other; most of the oil-producing assets are near or extend across their shared border. Since the split, oil production growth in Sudan and South Sudan has stagnated because of insufficient upstream investment and continued domestic political instability in both countries.¹

- Disruptions in oil production, disputes over oil revenue sharing, and lower oil prices have negatively affected both economies. Armed conflict in both countries has persisted in the post-referendum period because unresolved issues on domestic and interstate relations still linger. Both countries still contest some areas around the demarcated border established by the CPA. Disputes over the Abyei area and the Heglig oil field between the South Kordofan State in Sudan and the Unity State in South Sudan have been particularly contentious because these areas have strategic importance for the oil sector and have agricultural resources that both countries heavily use, adding another layer of complexity to the disputes.²
- In April 2023, armed conflict broke out in Khartoum, the Sudanese capital city, between the Sudanese Armed Forces (SAF), under the leadership of General Abdel Fattah al-Burhan (who is also the current leader of the military-led government), and the paramilitary Rapid Support Forces (RSF), under the leadership of Mohamed Hamdan Dagalo (also known as Hemedti). Both al-Burhan and Hemedti rose to power after the April 2019 military coup that removed the former Sudanese head of state Omar al-Bashir from power, but relations between the two deteriorated after al-Burhan dissolved the civilian transitional governing body in October 2021, extending his rule under a military-led government. As of January 2024, fighting between the two factions is still ongoing and has spread to other parts of the country, increasing the risk of shut-ins or damage to oil infrastructure that could reduce both Sudan's and South Sudan's crude oil production.³

Figure 1. Map of Sudan



Data source: U.S. Central Intelligence Agency, [CIA World Factbook--Sudan](#)

Figure 2. Map of South Sudan



Data source: U.S. Central Intelligence Agency, [CIA World Factbook–South Sudan](#)

Petroleum and Other Liquids

- Sudan and South Sudan collectively held an estimated 5 billion barrels of proved crude oil reserves at the beginning of 2024, which was unchanged from the previous year.⁴
- Most of the crude oil in Sudan and South Sudan is produced in the Muglad Basin and Melut Basin. Sudan and South Sudan produce three different crude oil blends: Dar, Nile, and Fula. The Dar and Nile blends are the two main crude oil grades used for export and domestic consumption. The Dar blend is a heavy crude oil with a low sulfur content. It also has a high total acid number (TAN) and has corrosive qualities that can make it difficult for refiners to process. The Dar blend is produced at Blocks 3 and 7 in the Melut Basin, which is controlled by South Sudan. The Nile blend is a medium, waxy crude oil produced in the Muglad Basin at Blocks 1, 2A, 2B, 4, and 5A; its crude oil characteristics make it a relatively more attractive blend to refiners because of its high fuel and gasoil yields. The Fula blend is a highly acidic crude oil produced in the Muglad Basin at Block 6 and is processed for domestic use (Table 3).⁵

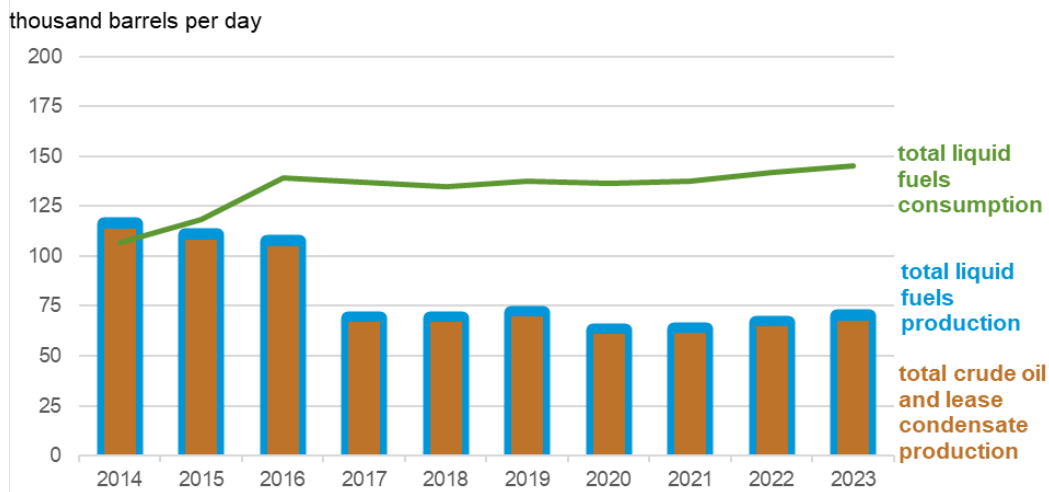
Table 3. Selected crude oil grades produced in Sudan and South Sudan

Crude oil grade	API gravity number (degrees)	Sulfur content (percentage)
Dar	26.4	0.12%
Fula	21.0	0.14%
Nile	32.8	0.05%

Data source: *McKinsey & Company Energy Insights*, Sudan government ministry

- Sudan produced an average of about 70,000 barrels per day (b/d) of total liquid fuels in 2023, and South Sudan produced an average of about 149,000 b/d. Sudan’s total liquid fuels production has steadily and significantly declined over the past decade because upstream exploration and development has been lacking in the country. Growth in South Sudan’s total liquid fuels production has been relatively flat, averaging about 153,000 b/d over the past decade. Both Sudan and South Sudan are seeking to attract investor interest through ongoing or upcoming upstream licensing rounds, but whether the rounds will attract sufficient upstream investment to boost total liquid fuels production remains unclear (Figures 3 and 4).⁶

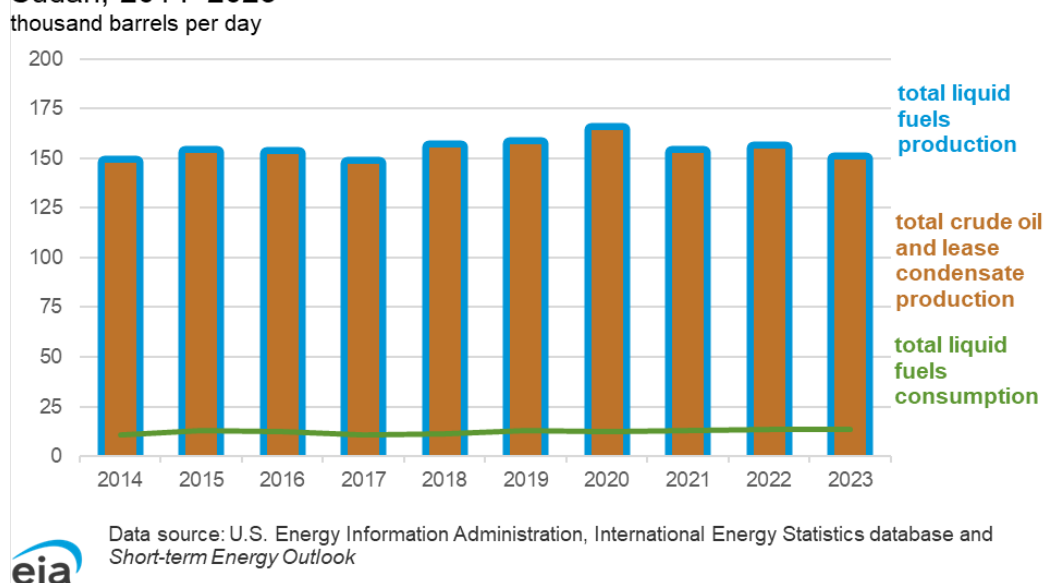
Figure 3. Total annual liquid fuels production and consumption in Sudan, 2014–2023



Data source: U.S. Energy Information Administration, International Energy Statistics database and *Short-term Energy Outlook*



Figure 4. Total annual liquid fuels production and consumption in South Sudan, 2014–2023



- In December 2022, Petronas announced that it had entered a share repurchase agreement with Savannah Energy, enabling Petronas to divest its entire South Sudan oil and natural gas asset portfolio to Savannah Energy once the transaction is completed. Petronas will reportedly relinquish its working interests in three joint operating companies (Greater Pioneer Operating Company, Dar Petroleum Operating Company, and Sudd Petroleum Operating Company) for up to \$1.25 billion.⁷
- Sudan has three oil refineries and three topping plants (smaller, less complex refineries). However, most of these facilities have either been shut in or decommissioned; only the al-Jaili refinery, which is the country's largest refinery and is approximately 45 miles north of Khartoum, and the El-Obeid topping plant are currently operating. Furthermore, the operational status of the al-Jaili refinery is unclear because violent clashes between the ruling government-aligned SAF and the paramilitary RSF over control of the refinery broke out in 2023, and damage to facilities at the refinery have been reported.⁸
- In South Sudan, the refinery at Bentiu finished construction and began commercial operations in 2021. The refinery at Bentiu can produce diesel, gasoline, and heavy fuel oil from domestic crude oil, enabling the country to meet some of its consumption needs and raising the possibility of exporting petroleum products regionally. South Sudan plans to construct other refineries to increase the country's refining capacity and reduce the need for imported petroleum products, but the timeline for the construction of these refineries is unclear (Table 4).⁹

Table 4. Oil refineries in Sudan and South Sudan

Country	Refinery	Operator	Nameplate capacity (thousand barrels per day)
Sudan	Khartoum (al-Jaili)	CNPC/Sudapet	100
	Port Sudan	Sudapet	22
	El Obeid	Sudapet	10
	Shajirah	Concorp	10
	Abu Gabra	Sudapet	2
South Sudan	Unity State (Bentiu)	Safinat (Russia)/Nilepet	10

Data source: Fitch Solutions Country Risk & Industry Research, African Development Bank

Natural Gas

- Sudan and South Sudan collectively held an estimated 3 trillion cubic feet of proved natural gas reserves at the beginning of 2024, which was unchanged from the previous year.¹⁰
- Neither Sudan nor South Sudan produces or consumes any natural gas.

Coal

- Neither Sudan nor South Sudan produces or consumes any coal.

Electricity

Sudan

- Total installed generation capacity in Sudan was 4.5 gigawatts (GW) in 2021. About half of the capacity was from fossil fuel sources, about 43% from hydroelectricity, and the remainder (57%) from renewable energy sources such as solar and biomass. Total electricity generation in Sudan was 16.6 billion kilowatthours (kWh) in 2020, of which 60% was generated by hydropower (Figures 5 and 6).¹¹
- Sudan's transmission and distribution network provides services to the country's major demand centers, such as Khartoum, and is largely concentrated in the more populous eastern part of the country, a relatively small geographic area. Transmission and distribution of electricity is limited, particularly in the rural areas in western Sudan.¹²
- Although power generation has continued to grow in the post-independence era, only about 62% of Sudan's population had access to electricity in 2021, according to the latest estimates from the World Bank. However, urban populations have substantially more access (84%) than rural populations (49%). People who are not connected to a grid use biomass or diesel-fired generators to meet their electricity needs.¹³
- Hydroelectricity in Sudan is generated from a number of large-scale hydropower plants in the south (Roseires and Sennar), the north (Merowe), and the Upper Atbara and Seteit rivers in the

east (Rumela and Burdana). The Rumela and Burdana dams were brought on line in 2018, providing an additional 320 megawatts (MW) of power generation capacity.¹⁴

- The government of Sudan has sought to diversify its power portfolio mix and has prioritized thermal power investments in recent years. The government is reportedly planning to build additional thermal power generation units at Garri (El-Jaili) and at Port Sudan that could collectively provide almost 1 GW of generation capacity, but the completion date for construction of the additional power units is unclear.¹⁵
- Sudan has significant wind and solar energy resources that are largely untapped. According to a World Bank study, Sudan has significant wind power potential along its coast on the Red Sea and in the Northern State. Sudan also has solar power potential, but renewable power tends to be small in scale and used for off-grid solutions.¹⁶

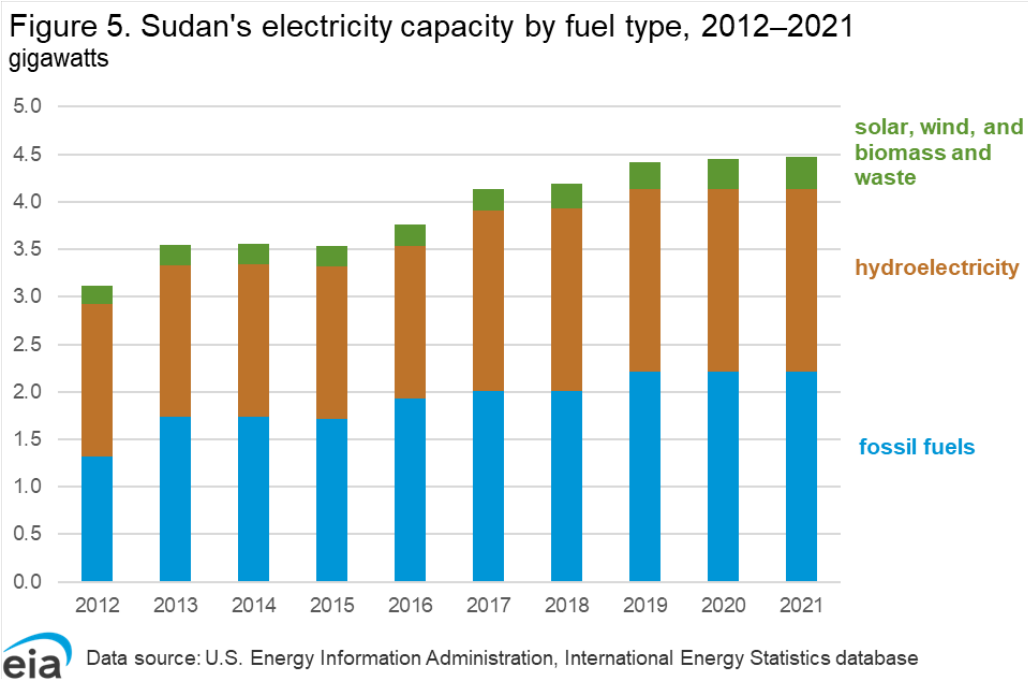
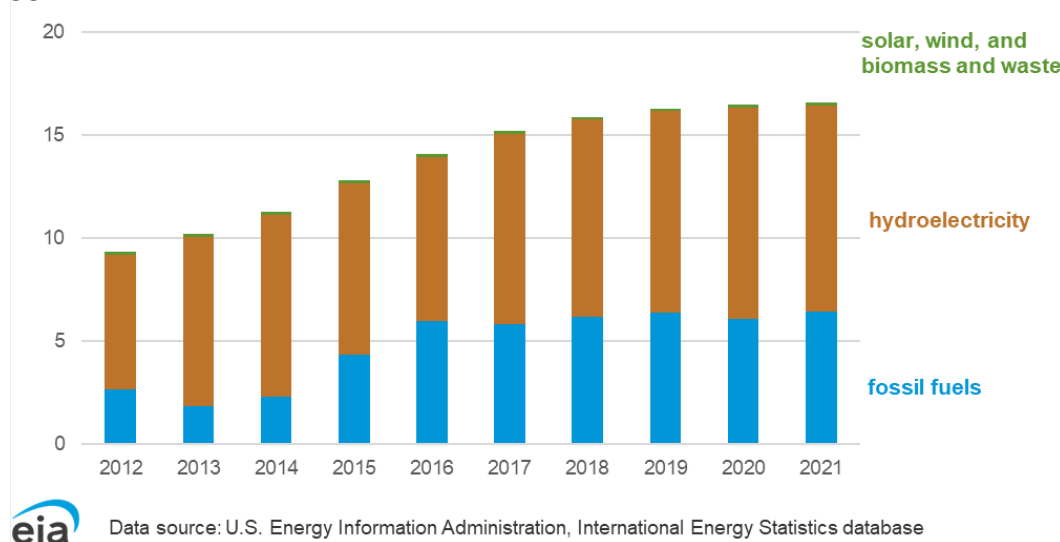


Figure 6. Sudan's net electricity generation by fuel type, 2012–2021
gigawatthours



South Sudan

- Total installed generation capacity in South Sudan was 0.12 GW in 2021. Nearly all of the capacity was from fossil fuel sources, and a marginal amount was from solar power sources. Total electricity generation in South Sudan was 0.6 billion kWh in 2021, nearly all of which was from fossil fuel sources (Figures 7 and 8).¹⁷
- South Sudan has one of the lowest electrification rates in the world; only 8% of its population had access to electricity in 2021, according to the latest estimates from the World Bank. Those connected to the power network experience frequent blackouts or forced load shedding, which makes standby generators necessary to meet electricity needs.¹⁸
- In June 2023, the governments of Uganda and South Sudan signed an agreement to allow South Sudan to import electric power from Uganda, and feasibility studies to construct an interconnector transmission line between the two countries is currently underway. The proposed transmission project would enable Uganda to supply electricity to Kaya and Nimule, two of South Sudan's towns near the Uganda border and would help address the serious lack of access to electricity in the remote and rural areas of South Sudan.¹⁹

Figure 7. South Sudan's electricity capacity by fuel type, 2012–2021 gigawatts

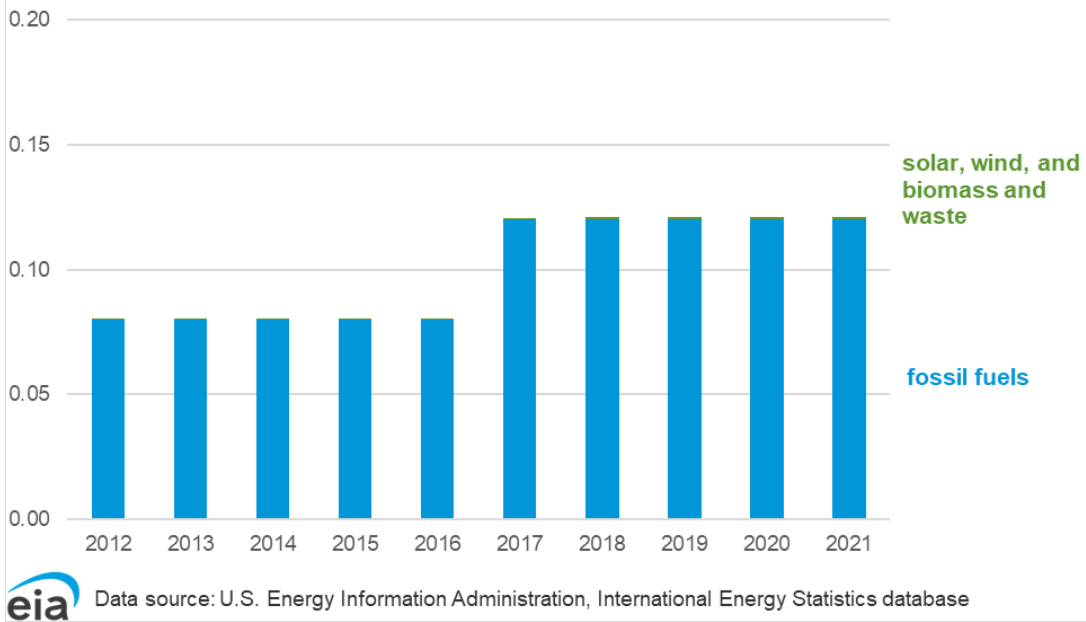
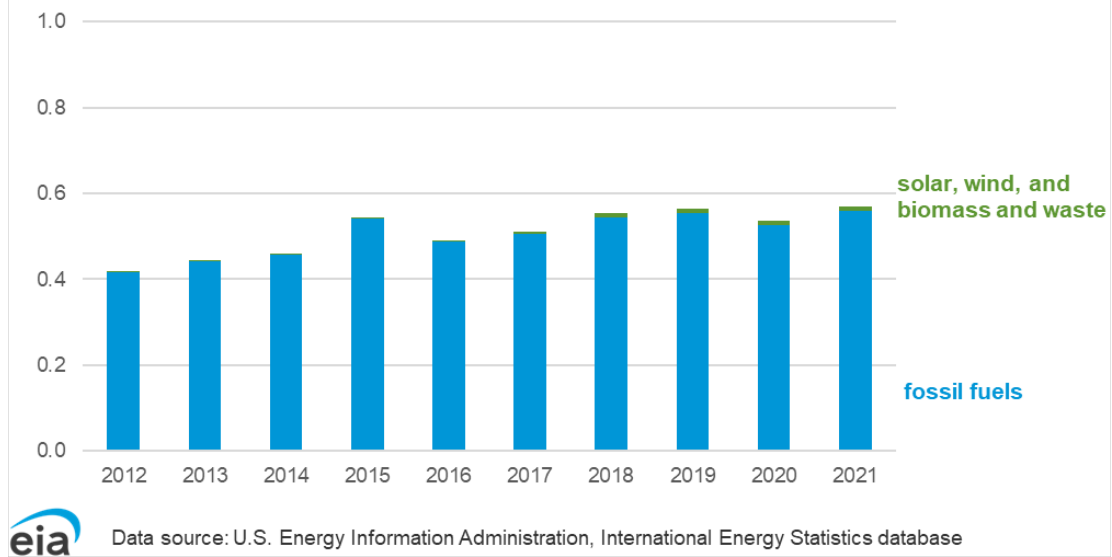


Figure 8. South Sudan's net electricity generation by fuel type, 2012–2021 gigawatthours

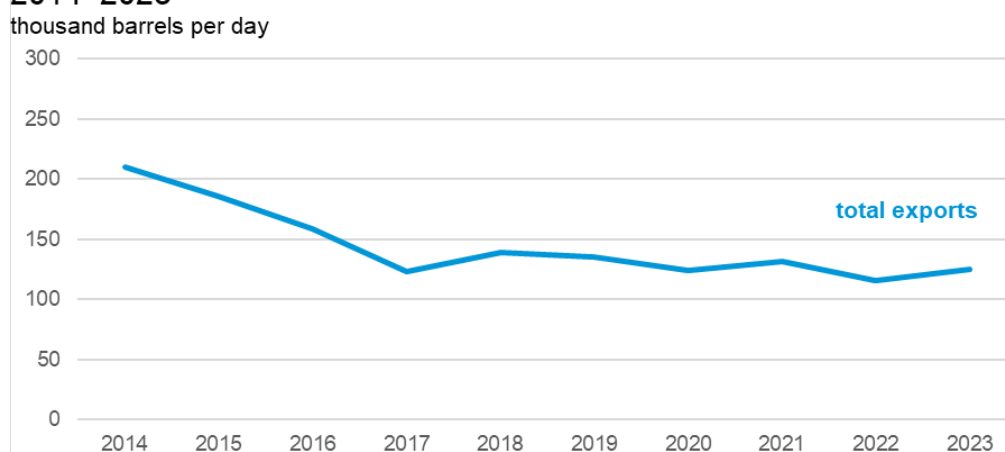


Energy Trade

- Sudan and South Sudan exports are primarily the Nile and Dar blends going to markets in Asia. Crude oil is exported from Port Sudan to Asia via the Bab el-Mandeb Strait. Given the lack of alternative transit routes, [Bab el-Mandeb is a strategically important chokepoint](#) where any blockages or closures could lead to significant increases in shipping time and costs.²⁰

- Sudan and South Sudan averaged about 145,000 b/d of crude oil exports between 2014 and 2023, according to estimates by Vortexa and EIA. Total crude oil exports from Sudan and South Sudan have declined over the past decade as a result of lower overall production from both countries. Sudan and South Sudan import virtually no crude oil because current production meets domestic demand (Figure 9).²¹

Figure 9. Sudan's and South Sudan's total annual exports of crude oil, 2014–2023



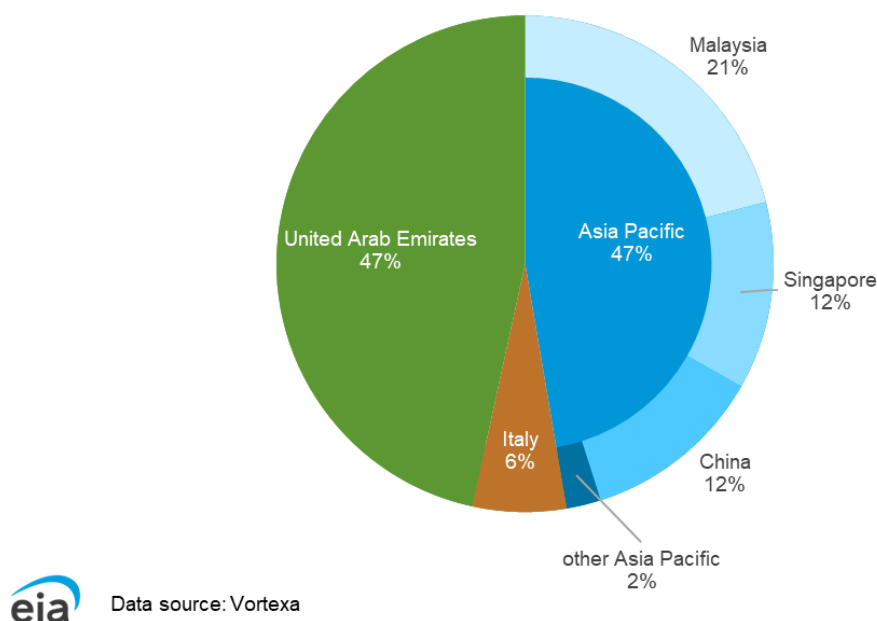
Data source: U.S. Energy Information Administration, International Energy Statistics database and Vortexa



Note: EIA estimates are for 2014–2018; subsequent years are Vortexa estimates.

- According to Vortexa, Sudan and South Sudan exported about 125,000 b/d of crude oil in 2023. The United Arab Emirates was the top destination country by volume, accounting for nearly half of total exports from the two countries. Malaysia was the second-highest destination by volume, importing about 26,000 b/d of Sudan’s and South Sudan’s crude oil in 2023. China and Singapore both imported about 15,000 b/d each in the same year. However, the volumes that were exported to Singapore likely ended up elsewhere because Singapore is a significant transshipment area for global crude oil trade (Figure 10).²²

Figure 10. Sudan's and South Sudan's crude oil and condensate exports by destination, 2023



- Neither Sudan nor South Sudan participate in any natural gas or coal trade and so, have no imports or exports.

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- ⁷ Shadia Nasralla, ed. Kirsten Donovan, “Savannah Energy follows Chad deal with South Sudan acquisition,” *Reuters*, December 12, 2022. Geetika Gupta and Mansi Anand, “PETRONAS announces exit from South Sudan as the NOC evaluates its international upstream portfolio,” S&P Global Platts, *S&P Global Commodity Insights*, March 7, 2023.
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- ¹¹ U.S. Energy Information Administration, International Energy Statistics database, accessed October 4, 2023.
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