SITUATION UPDATE

May 2024

Keeping the Oil Flowing: Sudan's Oil Sector During the 2023–24 War

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KEY FINDINGS

- Since the outbreak of civil war in Sudan in April 2023, control of the country's oil infrastructure has been split among different armed groups. The national military, Sudan Armed Forces (SAF), has retained control of the export terminal in the Red Sea port of Port Sudan. At the same time, a rival armed group, the Rapid Support Forces (RSF), seized—and now maintain—command of Sudan's primary refinery in Khartoum and at least one pumping station.

- Both parties have refrained from directly disrupting the flow of crude oil through Sudan's pipelines. The conflict, however, is obstructing the resupply of necessary maintenance materials for pumping stations, leading to a temporary stoppage on the Petrodar pipeline in February 2024.

- Petroleum refining has been severely disrupted at all processing sites in what appear to be strategic military moves by SAF and the RSF to limit the other's access to fuel.

- The parties initially refrained from targeting Sudan's extractive infrastructure, but an RSF attack in late October indirectly disrupted extraction.

Overview

Following South Sudan's independence in 2011, Sudan's oil revenue steadily declined, largely driven by a massive drop in volume. From 2011—when oil was Sudan's highest value export—to 2021, crude oil exports decreased from USD 8.1 billion to USD 359 million. By comparison, the export value of gold increased from USD 829 million to USD 2.85 billion over the same period, becoming Sudan's leading export commodity by value (OEC, n.d.). In the year prior to South Sudan's independence, Sudan produced more than 450,000 barrels per day (BPD) (Imam, 2020, p. 9). By 2021, production had dropped to 67,000 BPD (EIA, 2022), and Sudan was no longer a net oil exporter. Some of Sudan's revenue loss was offset by oil transit fees from South Sudan's oil production, which South Sudan paid in kind with 27,000 BPD as of March 2022 (IMF, 2023).

As the civil war continues in Sudan, SAF and the RSF both control areas that the country's oil pipelines pass through, raising concerns about the physical security of oil infrastructure and the sector's overall operational capacity. These concerns extend to neighbouring South Sudan, where its government is overly dependent on oil revenues. Recent projections are that 88 per cent of South Sudan's total revenue from July 2023 to June 2024 will be generated from the sale of oil (IMF, 2023, p. 22).

Oil production and flow were spared from major disruption for the first 12 months of the war. Both sides refrained from making direct attacks to shut down infrastructure for transporting crude oil. The conflict has, however, prevented both extraction sites and pumping stations from receiving necessary maintenance supplies and personnel. In February 2024, oil in the Petrodar pipeline congealed due to a shortage of diesel fuel for heating, leading to a pipeline rupture.

Production and distribution of refined fuels such as gasoline have been impaired, and both sides are intent on limiting their rival's access to fuel and hampering any financial gains made from its sale. While both groups initially refrained from disrupting oil extraction, they have increasingly shown willingness to damage extraction infrastructure to disadvantage their adversary.

Oil transportation

Sudan's oil pipeline network covers more than 3,700 km. One of its two primary pipelines, the Greater Nile Oil Pipeline (GNOP), flows from Sudan's Kordofan and Heglig—and South Sudan's Unity state—oil fields to Khartoum (Patey, 2014). The other, the Petrodar pipeline, transports oil from Sudan's Blue Nile state and South Sudan's Upper Nile state oil fields to Port Sudan. Their combined carrying capacity is 1.5 million BPD, well above the actual volume flowing through the pipelines (IMF, 2020, pp. 28–29).

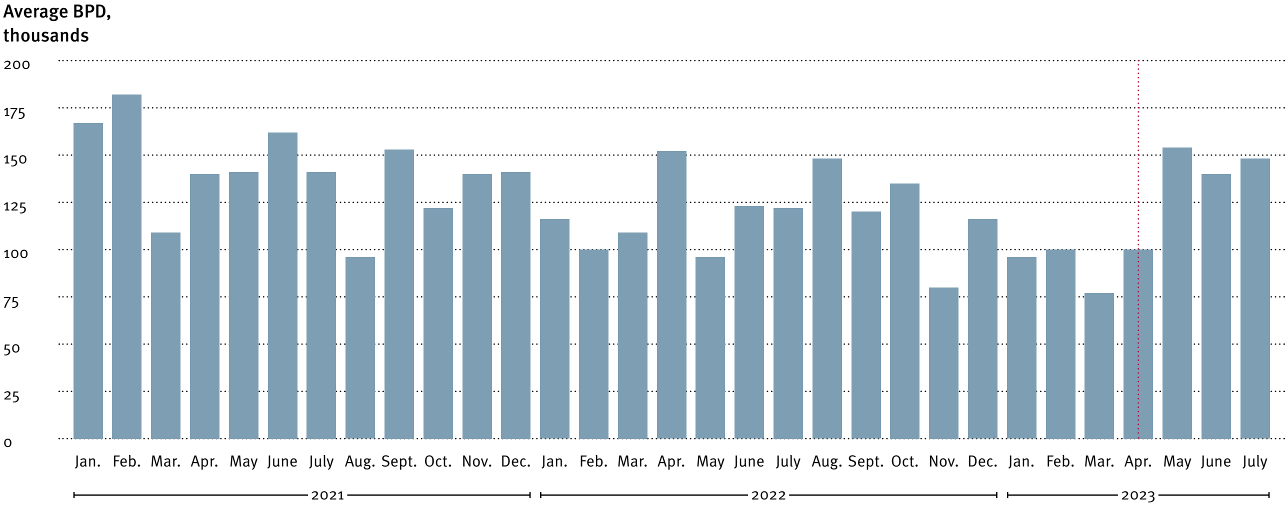
During the first week of fighting, SAF secured Port Sudan and the coastal Bashayer Marine Terminal (BMT)—through which all exported oil moves—in the scramble to control key infrastructure and military sites (Figure 1). The RSF seized Sudan's largest refinery, Al-Jaili, north of Khartoum in April 2023 (Al Arabiya, 2023a). Both the GNOP and the Petrodar pipeline pass through or near Al-Jaili, a critical refinery for domestic and military fuel consumption.

The Petrodar pipeline relies on six pumping stations to repressurize and heat crude oil, which is necessary to prevent it from congealing within the pipeline. Due to the chemical contents of the Dar Blend, which is South Sudan's main oil blend, the crude oil is too viscous and must be heated to flow. These pump stations are in the following areas:

- Station 1: Palogue, South Sudan;
- Stations 2 and 3: Al-Jebelain and Ash Shawal, White Nile state, which is a predominantly SAF-controlled area;
- Station 4: Al-Aylafoun, Khartoum state, an RSF-controlled area;
- Station 5: Aliab, River Nile state, which is SAF-controlled north of Shendi; and
- Station 6: Musmar, Red Sea state, a SAF-controlled area (ACLED, 2024; Al Arabiya, 2023a; Hydrocarbons-Technology, n.d.).[1]

1 Additional sources include Van Linge (2024) and Radio Dabanga (2023c).

Figure 1 Oil exports from Bashayer Marine Terminal per month, 2021–23



Notes: Estimates are from ship traffic. The red dotted line indicates the start of the conflict in Sudan.

Source: Marks and Okech (2023)

On 11 October 2023, the RSF took control of the Al-Aylafoun pumping station south-east of Khartoum (RSF, 2023a; 2023b), gaining the ability to disrupt the flow of oil before reaching the Khartoum refinery. In December 2023, the RSF launched an offensive from Khartoum to Wad Madani. The offensive line crossed the pipeline near Al-Aylafoun and intensified fighting in White Nile state, where stations two and three are located.

In February 2024, Bashayer Energy Services, which operates the pipeline, could not supply the Al-Aylafoun pumping station with diesel fuel due to the conflict (MEP, 2024), and in a letter to the Dar Petroleum Operating Company—a consortium of companies based in Juba—stated that diesel was urgently needed to heat the pipeline (BAPCO, 2024). The diesel shortage caused the oil to congeal, creating a stoppage on 10 February 2024 (MEP, 2024).

Bashayer Energy Services was able to repair the initial stoppage, but by the next day, there was a significant rupture in the pipeline 18 km north of station three in Ash Shawal (MEP, 2024). On 16 March 2024, Sudan's Ministry of Energy and Petroleum (MEP) declared force majeure on their obligations to tranship South Sudan's crude oil though the Petrodar line due to the inability to supply the pumping stations (MEP, 2024). The parties to the conflict refrained from direct attacks on the pipeline but did not guarantee the diesel delivery necessary to its function.

The cessation of the Petrodar pipeline will prevent the transport of any Dar Blend crude oil from either South Sudan or Sudan until repaired, although the Nile Blend may still travel through the GNOP.

Oil flow to the Al-Jaili Refinery is critical to South Sudan's economy, and before the war it provided Sudan with revenue via payments for oil transhipment used for refining and export. In 2013, both countries agreed that South Sudan would pay upwards of USD 24 per barrel—an agreement later amended to allow Sudan to refine a portion of South Sudan's exported oil for consumption in Sudan—in lieu of cash payments for the service. Sudan consumed a constant 27,000 BPD of South Sudanese oil in subsequent years.[2] Part of South Sudan's payments covered outstanding debts, which were paid off in 2021, leading to a reduction in domestic consumption in Sudan to around 20,000 BPD.[3] The International Monetary

2 Author email correspondence with sources close to the Government of South Sudan, October 2023.

3 Author email correspondence with sources close to the Government of South Sudan, October 2023.

Fund (IMF) projects a similar rate for South Sudan's fiscal year from July 2023 to June 2024 (IMF, 2023). With the reduced consumption or closure of Al-Jaili Refinery, it is unclear how much of South Sudan's oil appropriated in Sudan continues to be refined there or piped to Port Sudan for export. At current crude prices, 20,000 BPD of Dar Blend would market for USD 1.5–6 million (Marketwatch, n.d.).[4] Since SAF controls the BMT, it is positioned to control that revenue.

The closure of the Petrodar pipeline will reduce South Sudan's fees payable to Sudan. As of 2021, 75 per cent of South Sudan's oil exports are Dar Blend, which flows through the Petrodar line (MOP, 2021). The oil producer's shares most likely follow a similar distribution between the two pipelines given the similar oil-sharing arrangement across concessions (MOP, 2021).

Oil refining in Sudan

The Al-Jaili Refinery has the capacity to process 100,000 barrels of crude oil per day. Sudan has a smaller refinery along the GNOP, the El Obeid Refinery in North Kordofan, which was looted in July 2023 (Radio Dabanga, 2023a). The city is SAF-controlled but has been contested or besieged by the RSF multiple times during the conflict (Amin and Rickett, 2023). At full operating capacity, this facility can process 15,000 BPD, primarily into heating oil (ORC, 2024). As of 2021, none of Sudan's other refineries were operational after Port Sudan Refinery shut down in 1999 (MEP, 2021).

Attacks on the Al-Jaili Refinery have occurred several times since April 2023, rendering its production levels significantly below average (Al Arabiya, 2023b; Hamza, 2023). Some observers speculate that the damaged facility will likely have a greater long-term impact on Sudan's domestic market than it will on the RSF's ability to maintain military operations, as the RSF maintains access to fuels from other sources (Ahmed, 2023; Marks and Okech, 2024).

Sudanese media attribute the refinery stoppage to the RSF cutting off SAF-controlled cities, including Shendi and Wad Madani (Medameek, 2023; Hamza, 2023). With diminished control over the refining of crude oil, SAF's dependence on fuel imports has increased, and it has banned the transport of refined fuel to RSF-occupied areas of Khartoum (Ahmed, 2023).

On 7 November 2023, a fire occurred at the Al-Jaili Refinery's fuel storage tanks (*Sudan Tribune*, 2023a). The RSF alleged that the fire resulted from a SAF air strike (*Sudan Tribune*, 2023b), while SAF alleged that the RSF destroyed the refinery's control system—igniting the storage facility (*Sudan Tribune*, 2023c).

Al-Jaili is vulnerable to attack from SAF and could degrade from neglect as the conflict continues. The destruction of the refinery would force the Sudanese people to rely on more expensive fuel imports. As the conflict progresses, a norm that exists among the RSF and SAF against damaging Sudan's accumulated capital is breaking down, with permanent damage to Sudan's refining infrastructure becoming increasingly possible.

Oil extraction

Most of Sudan's domestic extraction occurs in West Kordofan and the Heglig oil fields (Imam, 2020). The pipeline passes through the GNOP routes in Western, South, and North Kordofan, as well as both SAF- and RSF-controlled territories. In South Kordofan, where forces of the Sudan People's Liberation Army-North (SPLA-N) led by Abdelaziz al Hilu control a significant area, clashes with SAF have also occurred—raising attention to both oil extraction and transport, as well as gold extraction (ACLED, 2023; Horner, 2024).

As in transportation, the conflict has indirectly affected extraction operation by disrupting the supply of material and personnel. Oil producers have reported major challenges with moving equipment between Port Sudan and extraction sites in the south, which has impacted production.

4 As of 7 February 2024, Brent Crude is trading at USD 79 per barrel. Dar Blend usually trades at a discounted rate of USD 4.

Sudan's MEP was also forced to relocate to Port Sudan (Reed, 2023).

On 30 October 2023, the RSF launched an attack against Balila Airport, a SAF base near several major extraction facilities in West Kordofan. Petro Energy, which is 95 per cent owned by the China National Petroleum Corporation, manages the nearby oil field (CNPC, n.d.). The airport caught on fire during the attack, and staff at the oil field fled, temporarily shutting down production.

The RSF stated that it targeted the SAF base at Balila Airport because SAF uses it for aerial bombardment of RSF forces (RSF, 2023c). After the battle, the RSF withdrew from the site (Radio Dabanga, 2023b; *Sudan Tribune*, 2023d), and oil workers were free to return (RSF, 2023c). While the attack had military objectives, RSF commanders likely calculated that the attack could disrupt oil extraction. This attack highlights that the RSF is willing to risk interrupting oil extraction if it deems military intervention necessary, including disrupting oil export revenue to SAF.[5]

Oil sector outlook

SAF and the RSF have generally refrained from disrupting crude oil transit but have disrupted refined fuel production, storage, and transport. Extraction facilities were initially spared from attack; however, some military operations have disrupted them.

The consequences of disrupting the pipeline are potentially severe for both parties. While SAF is positioned to benefit financially from oil exports, the RSF can disrupt the GNOP and Petrodar pipeline at any time due to its presence at Al-Jaili and Al-Aylafoun, and Kordofan. The price for doing so, however, would be severe financial and reputational consequences for the RSF. A sustained disruption would close wells that may not reopen since redrilling a well is expensive, and once the reserves are low enough, it is no longer worthwhile.

For the same reason, the 2012 oil shutdown in South Sudan led to the permanent closure of some wells (De Waal, 2015). A shutdown would also broadly cause further damage to Sudan's reputation among foreign investors. The RSF cannot stop Sudan's oil production without stopping South Sudan's production, which would likely trigger a financial and political crisis in South Sudan. Such a crisis would also damage the personal reputation of the RSF leader, Mohamed Hamdan Daglo or 'Hemeti', as he continues to seek political support from regional leaders and elevate his political status domestically.

In the refining sector, the RSF has caused disruptions because it offers high immediate-term military advantages and has—comparatively to other subsectors—lower long-term cost. Closing gasoline supply pipes forced SAF to turn to imported fuel, disrupting its mobility.

Sudan's oil extraction infrastructure was exempt from direct attacks until the RSF struck Balila Airport in October 2023. This attack was part of a broader RSF offensive, including heavy fighting in Darfur, which coincided with peace talks led by the United States and Saudi Arabia in Jeddah. Taking the Balila Airport, even temporarily, bolstered the RSF's leverage in ongoing bi- and multi-lateral negotiations by demonstrating their capacity and willingness to strike SAF funding sources within the oil sector.

Conclusion

A protracted oil shutdown in Sudan would be catastrophic for both Sudan and South Sudan. To preserve operations, efforts to mediate the conflict should include attention to the country's oil sector. As the conflict continues, the threat of disruption increases, with Sudan's interior infrastructure

5 Projecting the linear trend in Sudan's domestic production from 2014 to 2021 as reported in Imam (2020), the author estimates that production is 51,000 barrels per day (BPD). At current prices accessed through Marketwatch (n.d.), 51,000 BPD would market for USD 4.1 million per day. Imam (2020) revealed that the most recent contract details give the Sudanese government 38 per cent of revenue from domestic oil production, yielding a revenue of USD 1.5 million per day to Sudan, excluding transhipment revenue as discussed above.

already experiencing damage by its isolation from service resupply.

Demilitarizing the oil infrastructure—including Al-Jaili or extraction fields—is unlikely, as either party could rescind an agreement and use these areas to their advantage. The Al-Jaili Refinery, for instance, acts as a quasi-shield for RSF fighters as a SAF attack would likely damage it, which clashes have already demonstrated.

At a minimum, an agreement between SAF and the RSF could help facilitate the flow of refined gasoline across battle lines to aid humanitarian assistance and domestic-consumer access. Mutual acceptance of a production level would need to be brokered; however, any deal would be vulnerable to changes in battlefield conditions, such as SAF preventing RSF resupply of units in Al-Jaili and Khartoum Bahri. The welfare of Sudanese civilians requires urgent attention, and civilian access to consistent and low-cost liquid fuels is critical. The longer it takes to end the war, the greater the long-term consequences.

Abbreviations and acronyms

BPD Barrels per day

BMT Bashayer Marine Terminal

GNOP Greater Nile Oil Pipeline

MEP Ministry of Energy and Petroleum (Sudan)

RSF Rapid Support Forces

SAF Sudan Armed Forces

USD United States dollar

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This Situation Update was funded by a grant from the United States Department of State. The opinions, findings, and conclusions stated herein are those of the author and do not necessarily reflect those of the United States Department of State.

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