

# Crude Oil Transportation - Midstream Sovereignty of Kazakhstan

## Introduction

Kazakhstan's position as a major oil producer depends not only on extraction capacity but critically on the ability to transport crude oil from oilfields to markets. The midstream sector (which contains the transportation, storage, and wholesale marketing of crude oil) represents the essential link between upstream production and the domestic market (refining) or international sales (export). Beneath the surface of impressive export volumes lies a complex reality: Kazakhstan's ability to freely route its crude oil to diverse markets remains constrained by inherited infrastructure dependencies, geopolitical vulnerabilities, and concentration risks that limit energy sovereignty.

This article examines Kazakhstan's midstream sector through the dual lenses of crude oil transportation security and energy sovereignty. The first section provides an overview of export infrastructure, pipeline capacity, and crude oil flows. The second section applies the methodological framework developed in [our energy sovereignty analysis](#) to identify constraints, assess risks across four dimensions (diversification, infrastructure integrity, geopolitical and physical security, and demand-side policy), and evaluate options available to policymakers. As Kazakhstan pursues its long-term energy strategy, the fundamental challenge is whether the country can build the institutional flexibility, commercial independence, and enduring resilience necessary to convert pipeline capacity into energy sovereignty.

## Kazakhstan's Midstream Sector in 2024-2025

[Kazakhstan Energy Outlook 2025](#) by ENERGY Insights & Analytics provided a comprehensive analysis of the country's midstream sector. Kazakhstan's crude oil export infrastructure is dominated by several major pipeline systems that connect the country's production centers to international markets, with KazTransOil JSC [KTO] serving as the principal pipeline operator in the country. The Caspian Pipeline Consortium [CPC] pipeline remains the primary export route, transporting crude oil (mostly) from megaprojects to the Russian Black Sea port near Novorossiysk. The CPC's importance cannot be overstated: it handled 64.8 million

metric tons [MMt] in 2025, accounting for 82% of Kazakhstan's total oil exports (54.9 MMt in 2024 represented 80% of total oil exports).

The Atyrau-Samara pipeline system connects Kazakhstan to Russia's domestic pipeline network, providing a northern export route with an annual capacity of approximately 15-17 MMt. This route handled 9.3 MMt in 2025, representing 11.8% of Kazakhstan's exports (8.8 MMt in 2024, which was 12.8% of total oil exports). Kazakhstan resumed exports to Germany through the Druzhba pipeline in February 2023, delivering 1.5 MMt in 2024 and 2.1 MMt in 2025. It should be noted that this volume is accounted for in the Atyrau-Samara route transportation and utilizes (Russian) Transneft's pipeline infrastructure.

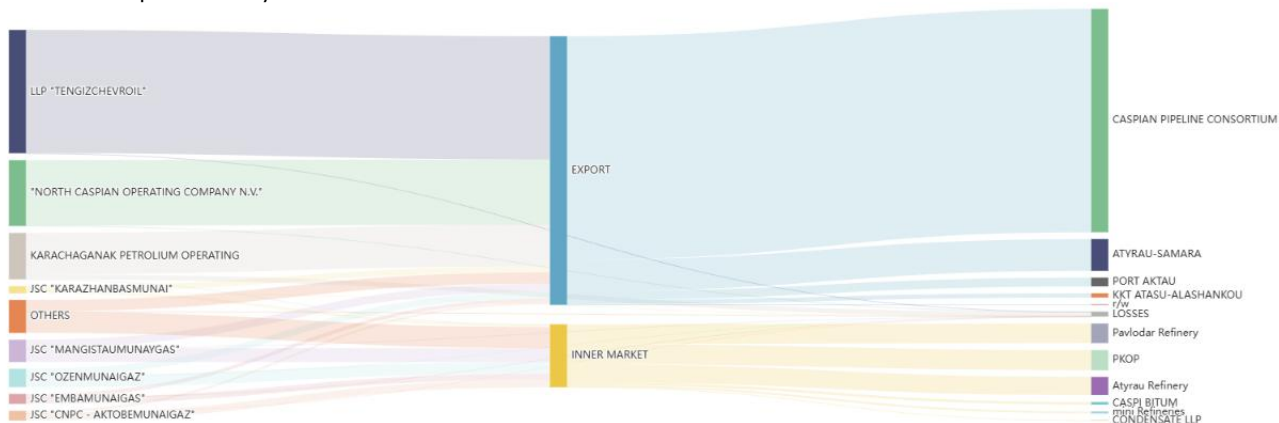
Port Aktau on the Caspian Sea serves as Kazakhstan's key gateway for trans-Caspian routes to destinations including Azerbaijan, for onward transport via the Baku-Tbilisi-Ceyhan pipeline [BTC] and Russia's Makhachkala port. As detailed in [the Kazakhstan Energy Outlook 2025](#), Port Aktau's current infrastructure annual capacity for 7.5 MMt supports these shipments, though actual volumes have been limited - 3.6 and 3.5 MMt in 2024 and 2025 accordingly. Constraints include limited tanker availability and Azerbaijan's preference to maintain the quality of its Azeri Light crude blend in BTC; both factors lead to lower netback compared with alternative routes.

The Kazakhstan-China pipeline [KCP], commissioned in phases between 2006 and 2009, transports crude oil eastward to China with a current annual capacity of approximately 20 MMt, representing Kazakhstan's most significant export route not involving Russian territory. In addition to Kazakhstan's crude oil, the pipeline serves as a transit route for Russian oil exports to China. Kazakhstan's actual exports through this route remained modest at 1.1 MMt in 2025, representing just 1.4% of total exports (1.2 MMt in 2024, which was 1.7% of total oil exports).

Rail transport is utilized for smaller export volumes to various destinations. Railroad transport capacity can handle up to 3 MMt annually, primarily for deliveries to Uzbekistan and Russian ports on the Black and Baltic Seas. But only 0.1 MMt was exported by railroad transport in 2025.

The major crude oil producers supplying export pipelines include megaprojects: [Tengizchevroil](#), which operates the Tengiz field and represents the largest single contributor to the CPC volumes; [the Kashagan consortium \(North Caspian Operating Company\)](#); [Karachaganak Petroleum Operating](#); along with [KazMunayGas associate companies and subsidiaries](#), including Mangistaumunaigas and Ozenmunaigas; and CNPC-Aktobemunaigas.

Distribution of production by destination



Source: ENERGY Insights & Analytics, Analytical Platform EXia

Kazakhstan's oil exports in 2025 increased by 14.8% to 78.8 MMt (68.6 MMt in 2024), contrary to infrastructure challenges at the year's end. Routes through Russia's territory accounted for 94% of total exports, underscoring the country's continued dependence on Russian transit infrastructure despite diversification efforts. The European Union remains Kazakhstan's primary export destination, accounting for approximately 79% of total exports in 2025. Export volumes to the EU rose to 60 MMt in 2025, a 6% increase compared to 2024. European markets, which have traditionally been the primary destination for Kazakhstan's oil exports, are expected to retain their importance throughout the foreseeable period.

Beyond export operations, the midstream sector is essential for domestic crude oil supply. The midstream infrastructure delivered 19.3 MMt in 2025 (18.3 MMt in 2024) of crude oil to local refineries, ensuring domestic energy security and refining capacity utilization. A comprehensive analysis of the downstream sector, including refining operations and refined products balance, was provided in our article on [downstream sovereignty](#).

The midstream sector has faced [significant challenges in recent months](#) that have exposed structural vulnerabilities. In [late 2025](#) and early 2026, the CPC pipeline experienced multiple disruptions due to drone attacks on Russian territory near the pipeline route, forcing temporary capacity reductions and rerouting of some crude volumes. These incidents reduced the CPC throughput by an estimated 15-20% during peak disruption periods. Additionally, [storms in the Black Sea](#) have periodically disrupted tanker loading operations at Novorossiysk, further constraining export capacity. The Atyrau-Samara route has come under increased Western scrutiny regarding sanctions compliance, creating additional uncertainty for crude flows through this corridor. Infrastructure constraints have also become apparent: insufficient single-point moorings [SPM] at the CPC limit operational flexibility, the KCP remains significantly underutilized, and inadequate pipeline capacity to Shymkent restricts domestic crude distribution options. This combination of factors has exposed the system's limited flexibility and the absence of strategic buffer mechanisms.

Despite the CPC's continued dominance, Kazakhstan has accelerated diversification efforts, particularly following the 2025-2026 security incidents. [Exports through Port Aktau to the BTC pipeline reached 1.3 MMt in 2025](#), with projections to grow to 1.6 MMt in 2026. Deliveries to Germany's Schwedt refinery totaled 2.1 MMt by the end of 2025, with expectations to rise to 2.5 MMt in 2026.

## Midstream Sovereignty

Recent drone attacks on the CPC infrastructure in late 2025, coupled with recurring disruptions since the onset of the Russia-Ukraine war conflict, have underscored the urgent need for a comprehensive reassessment of Kazakhstan's midstream sovereignty through the lens of diversification, infrastructure resilience, geopolitical security, and demand-side policy. The following analysis applies a four-pillar methodological framework to examine Kazakhstan's midstream sovereignty, drawing on the analytical approach established in [energy sovereignty assessment](#) while incorporating the latest developments in the country's oil transport infrastructure.

## Diversification

Diversification, as established in [the energy sovereignty framework](#), refers to the strategic distribution of supply sources, processing facilities, and market channels to minimize dependence on single points of failure. In midstream operations, this covers alternative pipeline routes, multiple (sea)port facilities, varied transportation modes, and access to different regional markets. True diversification creates redundancy and optionality, enabling the system to absorb shocks in any single supply chain without cascading failures across the entire network.

*Constraints.* The existing alternative routes operate far below the capacity needed to (significantly) diversify the CPC volumes. The KCP's [Atasu-Alashankou pipeline to China](#) has a nameplate capacity of 20 MMt annually, but bottlenecks in the Kenkiyak-Kumkol section restrict flows to just 10 MMt. A 2017 agreement with Rosneft, extended in 2023, secured pipeline access for Russia to deliver [10 MMt annually to China](#), further limiting Kazakhstan's export potential. Caspian Sea port at Aktau also faces limitations, with [Aktau port's loading capacity](#) restricted to 7.5 MMt annually and requiring expansion to accommodate larger vessels. Kazakhstan's landlocked position necessitates transit through neighboring countries, creating inherent dependencies that cannot be eliminated in full. Multi-stage logistics involving tankers, port handling, and multiple transit countries make alternative corridors

[less cost-competitive compared to the CPC](#), potentially affecting profit margins and market competitiveness.

*Risks.* Insufficient diversification has already materialized in concrete disruptions. Following drone attacks on the Kropotkinskaya oil pumping station in late 2025, [the CPC operator projected a 30-40% reduction in throughput](#) for six to eight weeks. [A drone attack on November 29, 2025](#), severely damaged the SPM facility at the Novorossiysk terminal, halting all loading operations and [reducing weekly capacity by approximately 900,000 tons](#). [KTO reduced oil transshipment via the CPC by 15% in 2025](#), dropping to 3.5 MMt. Russia's July 2025 [temporary ban on foreign oil tankers](#) loading at Black Sea ports without the Federal Security Service's [FSB] authorization directly threatened Kazakhstan's export capabilities, potentially removing up to 2% of global oil supply in the worst possible case.

*Strategic options.* Achieving meaningful diversification requires action across multiple dimensions. First, expand domestic refining capacity by [increasing the Shymkent oil refinery from 6 to 12 MMt per year](#) and constructing a new refinery (in [Mangistau](#) or [Ulytau](#)). Second, maximize KCP utilization by expanding the Kenkiyak-Kumkol pipeline capacity and rearranging transit arrangements with Rosneft. Kazakhstan can realistically supply approximately 9 MMt to China in the medium term (if netback is competitive enough). Third, advance the Trans-Caspian corridor's economic viability by improving netback competitiveness relative to the CPC route. Kazakhstan transported just 3.5 MMt via the port Aktau in 2025, while the port's annual capacity is about 7.5 MMt and can be expanded further.

## Infrastructure integrity and capacity management

Infrastructure integrity and capacity management, within [the energy sovereignty framework](#), involves the physical reliability, technical resilience, and operational continuity of critical energy assets. For Midstream, it means pipeline construction and maintenance quality, system redundancy, backup facilities, monitoring and early warning systems, and swift repair and recovery capabilities. Infrastructure integrity determines whether capacity exists only on paper or can be reliably deployed when needed, particularly during stress scenarios when obvious options may be unavailable.

*Constraints.* The Kenkiyak-Kumkol section of the KCP operates at full nameplate capacity of 10 MMt annually, limiting any additional transport of crude from West Kazakhstan. Current Storage capacity represents a critical systemic constraint, with existing tank farms inadequate to create meaningful buffers against pipeline disruptions or enable flexible export scheduling, forcing continuous-flow operations that offer no resilience against interruptions. The overwhelming concentration of export capacity in CPC, which carried 64.8 MMt or 82% of export volumes in 2025, reflects not just routing preference but a fundamental constraint

in available alternatives, as no combination of other routes currently possesses the capacity to absorb even half of the CPC volumes.

*Risks.* Kazakhstan faces operational risks threatening both immediate transport continuity and long-term system capability. The attacks on the CPC infrastructure discussed previously demonstrated this vulnerability very clearly. The single-point-of-failure risk inherent in the CPC's dominance means that any disruption immediately paralyzes most of Kazakhstan's oil exports with no adequate backup capacity. Breakdowns and attacks on SPMs at Novorossiysk exposed the terminal infrastructure failure risk at loading points. Cascade failure risk pervades the entire system, where a disruption at any critical node can trigger failures throughout the network. The absence of meaningful redundancy creates perpetual infrastructure vulnerability that fundamentally undermines energy sovereignty and economic security.

*Strategic options.* Kazakhstan should create an operational "margin of safety" by ensuring pipeline utilization does not exceed something around 80% of nameplate capacity. The country should prioritize unblocking critical bottlenecks, particularly the Kenkiyak-Kumkol segment of the KCP, currently operating over the nameplate capacity, requiring a twofold expansion. Additionally, Kazakhstan should develop underground strategic petroleum storage facilities in salt caverns, following the [U.S. Strategic Petroleum Reserve](#) model, offering the lowest-cost storage, environmental security, and long-term stability without crude oil degradation.

## Geopolitical and physical security

Geopolitical and physical security, within [the energy sovereignty framework](#), addresses the vulnerability of energy systems to external political pressures, territorial disputes, sabotage, accidents, and natural disasters. For the Midstream sector, this dimension examines how geographic pipeline routing, political relationships with transit states, and vulnerability to military attacks shape energy sovereignty. True security requires not only physical protection of assets but also diplomatic and commercial arrangements that preserve operational autonomy even amid a shifting geopolitical landscape.

*Constraints.* The most immutable constraint is Kazakhstan's landlocked position, creating absolute dependence on transit through neighboring countries and eliminating sovereign control over the entire export chain. The concentration of oil production in western Kazakhstan, particularly Tengiz, Kashagan, and Karachaganak oilfields, creates geographic constraints where the shortest routes necessarily cross Russian territory. The CPC pipeline's route represents a structural constraint embedded in decades-old international agreements involving Kazakhstan, Russia, and multiple Western oil companies, including Chevron, ExxonMobil, and Shell, where Kazakhstan cannot unilaterally alter operations. Kazakhstan's

geolocation and diverse interests of great powers create geopolitical constraints requiring careful relationship balancing.

*Risks.* Pipelines have become high-value targets due to economic importance and vulnerability developed during peacetime operations. Recent geopolitical tensions demonstrated how energy infrastructure becomes collateral damage in conflicts where Kazakhstan is not a participant, as seen in [recent drone attacks on the CPC facilities](#). The threat landscape is broader, with pipeline infrastructure globally vulnerable, including [sabotage in Iran's gas pipeline network](#) and persistent [attacks on Nigeria's oil transport pipelines](#). Regulatory weaponization risk intensified in July 2025 when Russia implemented a [temporary ban on foreign oil tankers](#) loading at Black Sea ports without FSB authorization, creating immediate uncertainty for Kazakhstan's exports. Alternative route vulnerability extends beyond Russian territory, as the Trans-Caspian route faces security challenges, including Caspian maritime incidents, political instability, and risks that South Caucasus conflicts could disrupt pipelines.

*Strategic options.* Kazakhstan should prioritize physical and cyber security of midstream infrastructure through security exercises, emergency response plans, and coordination with security services. At the highest political level, Kazakhstan should formally declare that threats to its midstream assets abroad will result in diplomatic consequences. Additionally, the country should establish strategic crude oil reserves equivalent to 90 days of supply for refineries in case of interrupted deliveries.

## Demand-side policy

Demand-side policy (including strategic regulation of exports), within [the energy sovereignty framework](#), encompasses the regulatory, fiscal, and institutional mechanisms that shape consumption patterns, manage demand during supply constraints, and align market behavior with energy security objectives. This includes policies ensuring adequate domestic energy supply while optimizing export revenues, developing value-added processing to reduce crude export dependence, and flexibility to redirect exports based on market conditions. Effective demand-side policy creates flexibility in the system, enabling authorities to manage consumption during shocks without resorting to crude rationing or market disruptions.

*Constraints.* Kazakhstan's current refining capacity, nearing 20 MMt annually, is insufficient to significantly reduce crude export dependence. While [the government adopted a long-term oil refining industry development concept](#) envisioning expansion to 39 MMt by 2040, this remains a distant goal requiring substantial investment. Long-term commitments to specific export routes and the interests of megaprojects' investors limit Kazakhstan's ability to respond dynamically to changing market conditions or geopolitical developments. The country's vast dependence on the CPC reflects not only infrastructure constraints but also

contractual obligations that cannot be easily altered. While Kazakhstan exports to multiple countries, including Italy, the Netherlands, France, Romania, Greece, and China, the concentration of physical export routes limits the ability to capitalize on regional price differentials or shift volumes strategically.

*Risks.* When the CPC disruptions occurred in 2025, [KTO could only redirect 360,000 tons](#) to alternative routes in December alone, a fraction of the normal volumes of the CPC. This limited flexibility resulted in production cuts and lost revenue, demonstrating the consequences of insufficient export and/or storage optionality. Limited refining capacity forces the country to export primarily crude oil rather than higher-value refined products, making it more vulnerable to disruptions and limiting value capture.

*Strategic options.* Kazakhstan should implement pricing and fiscal mechanisms making the domestic market as economically attractive as export markets, enabling flexible redirection of crude flows. This includes establishing export parity pricing for domestic crude supplies, differential taxation favoring domestic refining over crude exports, and regulatory frameworks incentivizing value-added processing. Kazakhstan should establish strategic export coordination mechanisms to optimize routing decisions based on real-time market intelligence. A critical pathway to increasing domestic oil consumption is accelerated development of the petrochemical industry, transforming crude oil into higher-value products while creating new domestic demand. Kazakhstan has launched an ambitious [\\$15 billion petrochemical development roadmap for 2024-2030](#), encompassing six major projects expected to create 3,500 permanent and 16,000 temporary jobs. The [oil and gas chemical sector grew by 12% in 2025](#), positioning petrochemicals as a key driver of non-resource exports and domestic oil consumption.

## The Bottom Line

The country's dependence on the CPC pipeline, carrying over 80% of oil exports through Russian territory, has created a fundamental sovereignty deficit across all four analytical dimensions. Recent disruptions from drone attacks have transformed theoretical vulnerabilities into concrete economic losses and strategic constraints, exposing critical domestic infrastructure gaps: insufficient capacity to absorb diverted volumes in the domestic market, inadequate storage facilities, and limited throughput capacity of the Trans-Caspian route. The path toward midstream sovereignty requires several key solutions that can simultaneously address multiple risk domains, creating compounding returns on strategic investment. Some of these measures are already being implemented, while others remain in the planning phase.

Expanding the Kenkiyak-Kumkol pipeline section addresses both diversification and infrastructure integrity by unlocking the full 20 MMT capacity of the Kazakhstan-China

corridor while reducing the CPC dependence. Developing underground strategic petroleum storage in salt caverns simultaneously enhances infrastructure resilience, provides operational flexibility for demand-side management, and creates buffers against geopolitical disruptions. Accelerating domestic refining and petrochemical capacity expansion reduces export route vulnerability while capturing higher value from hydrocarbon resources and strengthening domestic supply security. Establishing operational safety margins by maintaining pipeline utilization around 80% of capacity creates the flexibility needed to respond to disruptions, accommodate maintenance requirements, and redirect flows based on market conditions or security threats. The expansion of Trans-Caspian infrastructure addresses diversification, reduces geopolitical exposure, and creates the physical capacity needed for sound export optionality. These selected solutions share a common characteristic: they transform Kazakhstan's midstream sector from an inelastic system vulnerable to single-point failures into a resilient network capable of absorbing shocks, adapting to changing conditions, and serving the country's long-term strategic interests.

Central to this change is the principle of "margin of safety" - the deliberate creation of spare capacity, strategic reserves, and redundant systems that provide buffers against disruptions rather than optimizing for maximum throughput under ideal conditions. As emphasized previously, the pursuit of sovereignty does not imply isolationism or complete self-sufficiency. Kazakhstan's landlocked geography and position between major powers make interdependence not merely inevitable but potentially advantageous when structured appropriately. The goal is not to eliminate all dependencies but to transform asymmetric vulnerabilities into balanced interdependencies where Kazakhstan possesses real alternatives, maintains strategic reserves, and participates in energy relationships from a position of strength rather than necessity. The technical and economic pathways are clear; the challenge lies in mobilizing the political will, financial resources, and institutional coordination to implement these solutions urgently.

## ENERGY Insights & Analytics

Analytical center "ENERGY" LLP (ENERGY Insight & Analytics) is a joint venture between [the KAZENERGY Association](#) and the IT company [AppStream](#). The company aims to become a priority source of data, analytical information, and recommendations for Kazakhstan's oil, gas, and electric power industries, allowing decision-makers to analyze and predict the most significant industry indicators with details on leading market players. Activities of ENERGY Insight & Analytics incorporate the whole analytics cycle with consequent stages: Descriptive, Diagnostic, Predictive, and Prescriptive analytics.

The key tool and product of ENERGY Insight & Analytics is internally developed software - [the Analytical Platform EXia](#), aimed to identify, localize, format, and present data most efficiently for the specified use cases.

## Disclaimer

This document is for informational purposes only. The information in this document is not a recommendation to buy, hold until maturity, sell any securities, or make any investment decisions, and is not a call for action.

Any statement, estimate, or forecast included in this document regarding the expected future results may not be accurate and, therefore, should not be relied upon as an obligation or assurance regarding future results. Analytical Center "ENERGY" LLP (hereafter – ENERGY Insight & Analytics) does not assume any obligation or liability with respect to the recipient or any other person for damage or loss of any kind resulting from the use or erroneous use of this document or its part by the recipient or other person; does not accept and does not assume any future obligations to update the document or its part or to clarify or notify any person about inaccuracies contained in the document or its part that may be revealed.

ENERGY Insight & Analytics materials cannot replace the knowledge, judgment, and experience of the users, their management, employees, consultants, and (or) clients during the adoption of investment and other business decisions. ENERGY Insight & Analytics receives information from sources that are, in the company's opinion, reliable, but ENERGY Insight & Analytics is not responsible for the accuracy of the information, i.e., does not audit or otherwise verify the data presented and is not responsible for their accuracy and completeness.

## Contact and Follow Us



[www.exia.kz](http://www.exia.kz)



[info@exia.kz](mailto:info@exia.kz)



<https://www.linkedin.com/company/energy-insight/>



10 D. Kunayev street, Astana, Kazakhstan