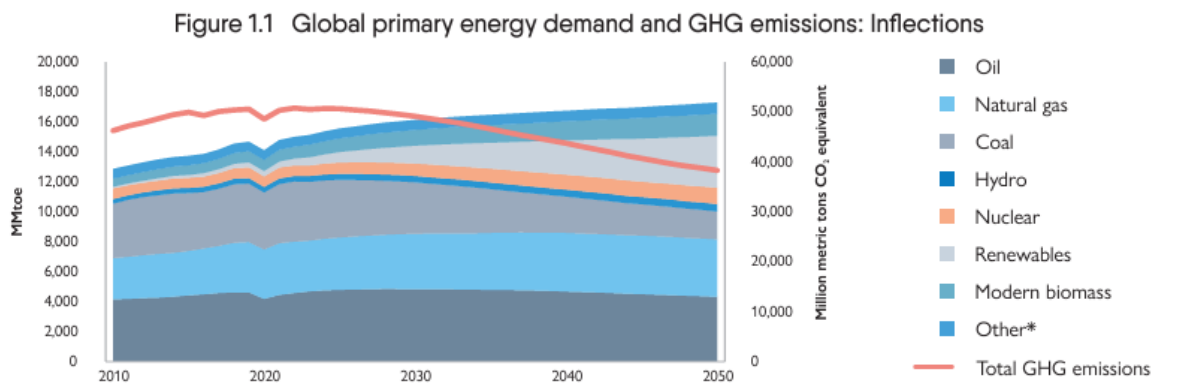


Natural Gas – Kazakhstan’s Great Expectations

Introduction

The global energy landscape is rapidly evolving as countries prioritize energy security, sustainability, and economic growth. Natural gas, often described as a “bridge fuel,” plays a crucial role in the energy transition by offering a cleaner alternative to coal and oil. According to the below chart from the [National Energy Report 2023 by KAZENERGY](#), the share of natural gas in the global energy mix is expected to lead by 2050.



Notes: *Includes traditional biomass, solid waste, ambient heat, and net trade of electricity, hydrogen, and heat.
Source: S&P Global Commodity Insights.

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Source: National Energy Report 2023

Natural gas accounts for a significant share of the global energy balance, and its role is expected to grow amid efforts to achieve net-zero targets. With the increasing importance of natural gas in the global energy mix, Kazakhstan, a country [endowed with substantial reserves](#), is presented with both opportunities and challenges. The balance of natural gas in Kazakhstan directly impacts not only the domestic economy but also the country's role in the broader regional energy dynamics. In Kazakhstan, the development of new gas processing plants [GPZs] is central to unlocking the potential of existing gas reserves. Additionally, increasing gas production will allow Kazakhstan to extract more oil, as gas is also injected into reservoirs to intensify oil recovery. However, it's important for readers to understand that a competitive return on invested capital [ROIC] is a critical factor for investors when deciding to allocate their capital to Kazakhstan's natural gas industry. While ensuring a supportive environment for investors is essential, it should not come at the expense of the country's broader interests. Balancing these priorities is crucial to fully realizing the potential of the country's natural gas sector.

Global trends and opportunities for natural gas

The United States are the world’s by far largest producer of natural gas with around [41.3 trillion cubic feet](#) [cf] in 2023 [approximately 1.17 trillion cubic meters [cm], using the conversion factor of 1 cubic meter = 35.315 cubic feet]. Russia confidently holds the second spot among the largest natural gas producers, but the gap with the U.S. [is wide](#). Among the top-5 natural gas producers are countries like Iran, China, and Canada. Since the U.S. and Canada have closely integrated natural gas infrastructure, we will use North America as a benchmark and the global flagman of the natural gas industry.

According to [the source](#), North America had 1,782 active gas processing plants with a total gas processing capacity of 227.8 billion cf per day [bcfd] as of January 2022. The U.S. and Canada combined natural gas production averaged around 137 bcf in 2022. As we see, North American gas processing plants are very far from utilizing full capacity and the largest midstream companies nevertheless continue investing in natural gas infrastructure. If we refer to the [latest earnings presentation of Enbridge](#), the largest midstream company in North America, we can see that the lion’s portion of the company’s Capex budget is allocated to expanding its gas infrastructure. Other North American midstream giants like Energy Transfer LP are also betting big on expanding their natural gas infrastructure.

| | Project | Expected ISD | Capital (\$B) |
|--------------------------------------|--|--------------|--------------------------|
| Liquids Pipelines | Gray Oak & Ingleside Expansion | 2025-2026 | 0.1 USD |
| | Enbridge Houston Oil Terminal | 2025 | 0.2 USD |
| Gas Transmission | Modernization Program | 2024-2027 | 2.9 USD |
| | Venice Extension | 2024 | 0.5 USD |
| | Appalachia to Market Phase II | 2025 | 0.1 USD |
| | Longview RNG | 2025 | 0.1 USD |
| | Tennessee Ridgeline | 2026 | 1.1 USD |
| | T-North Expansion (Aspen Point) | 2026 | 1.2 CAD |
| | Woodfibre LNG | 2027 | 1.5 USD |
| | Sparta | 2028 | 0.2 USD |
| | T-South Expansion (Sunrise) | 2028 | 4.0 CAD |
| Gas Distribution & Storage | CAD Utility Growth Capital ¹ | 2024-2026 | 1.5 CAD |
| | Transmission/Storage Assets ¹ | 2024-2026 | 0.7 CAD |
| | New Connections/Expansions ¹ | 2024-2026 | 0.9 CAD |
| | U.S. Utility Growth Capital ² | 2025-2027 | 3.7 USD |
| Renewables | Fox Squirrel Solar - Phase 2 | 2024 | 0.3 USD |
| | Provence Grand Large | 2024 | 0.1 CAD |
| | Calvados Offshore ³ | 2025 | 0.9 CAD |
| | Orange Grove Solar | 2025 | 0.3 USD |
| Total secured capital program | | | \$24B⁴ |
| Capital spent to date | | | \$3B ⁵ |

Source: Enbridge

The largest American natural gas producers recognize robust potential of liquefied natural gas [LNG]. EQT Corporation is the largest natural gas producer in the U.S. and the company forecasts that the global LNG market will double by the late 2030s. The good information for our country is that Asia will be the major LNG demand growth driver. The U.S. natural gas corporations see a massive opportunity to build value for their shareholders via LNG export potential and they boost Capex to maximize their LNG potential. According to [Yahoo Finance](#), the U.S. LNG export capacity is expected to rise 80% by 2028.

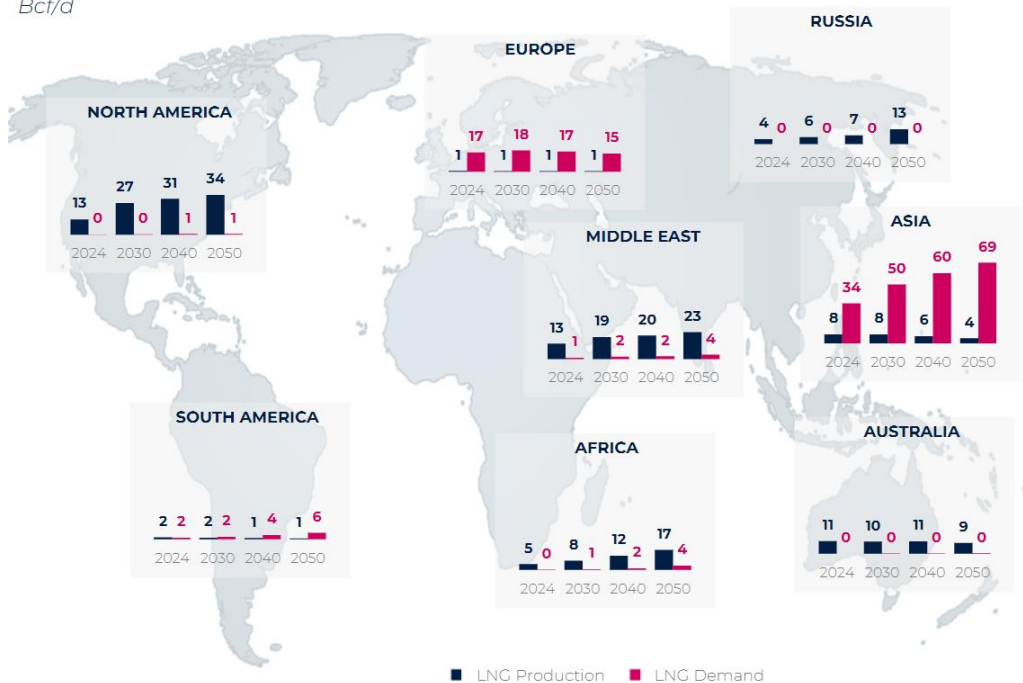
While Kazakhstan, as a landlocked country, is not directly exposed to these secular LNG tailwinds, it stands to benefit from the overall increase in natural gas demand in Asia. The

country’s proximity to Asia’s largest economies provides a significant advantage in the context of rising energy needs. Despite the current lack of direct natural gas export infrastructure, Kazakhstan's shorter supply routes could offer a distinct cost advantage and make potential capital projects more economically attractive.

That said, there is considerable potential for Kazakhstan to enhance its natural gas export capabilities if a pipeline to India is constructed in the future. This project would involve crossing multiple countries, such as Turkmenistan, Uzbekistan, Afghanistan, and Pakistan, making it a complex undertaking with significant geopolitical considerations. However, given the recent geopolitical shifts and challenges surrounding Russia, such a pipeline project becomes increasingly feasible. The potential for this infrastructure could further bolster Kazakhstan’s role in meeting Asia’s growing energy demands.

GLOBAL LNG SUPPLY AND DEMAND ESTIMATES

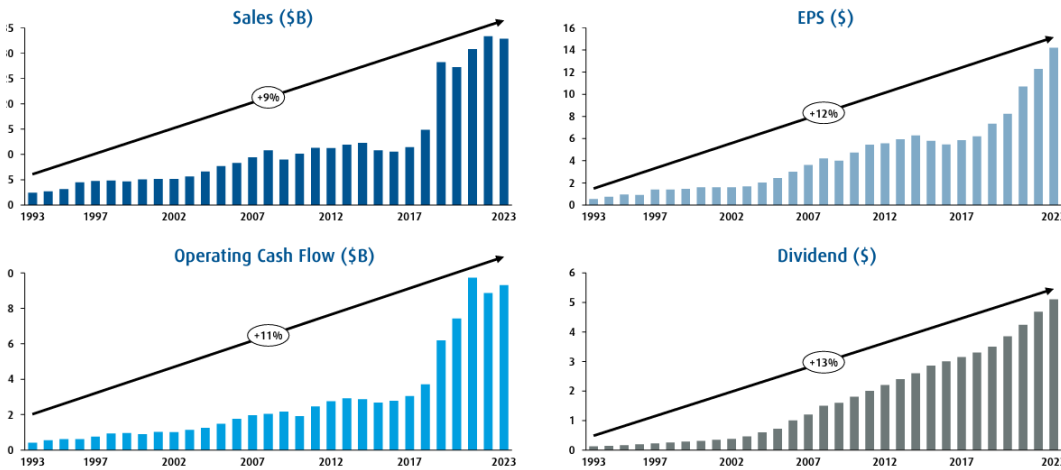
Bcf/d



Source: EQT Corporation

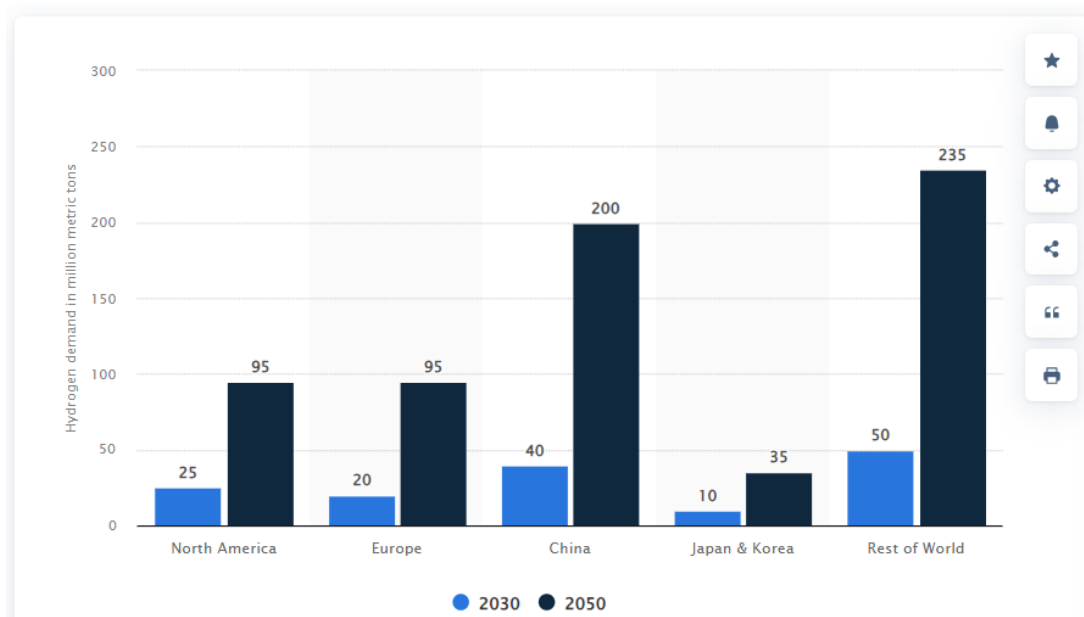
Another attractive market for the natural gas industry is the production of industrial gases. According to [Grand View Research](#), the global industrial gases market size is expected to deliver a 7.42% CAGR between 2023 and 2030. Such a growth rate is attractive and can be another long-term growth driver for Kazakhstan’s economy. Moreover, the industrial gases industry boasts high returns for investors. We can see this by the example of the world’s leading industrial gas producers like Linde plc, which is the world’s largest player with an above \$200 billion market capitalization. The company demonstrates consistent growth across all key metrics and is an apparent dividend growth superstar.

Historical Performance*



Source: Linde plc

The demand for industrial gases is expected to remain robust for decades as the world is shifting towards digitalization across various applications. There are various ways of producing hydrogen [H₂], but the most common way is by processing natural gas. The demand growth for hydrogen is expected to be robust over the next several decades as this gas is extensively used for electronics manufacturing in the semiconductor, display, LED, and photovoltaic application segments. According to [Statista](#), hydrogen demand is expected to grow multiple fold across the world between 2030 and 2050.



Source: statista.com

That said, the natural gas industry is a thriving one and there are vast opportunities for it. As we saw above, there are strong secular trends that will highly likely support strong natural

gas demand over the next several decades. The expected multiple-fold growth in demand for LNG and industrial gases suggests that gas processing plants will play a crucial role in the global energy security.

Natural gas industry in Kazakhstan

Kazakhstan’s natural gas sector is shaped by several critical stakeholders across the value chain—from extraction to transportation and consumption. According to the data obtained from the [Analytical Platform EXia](#), 2.09 trillion cf [59.1 Bcm] of natural gas were produced in 2023. Major players producers include giants like Tengizchevroil [TCO], Karachaganak Petroleum Operating [KPO], and North Caspian Operating Company [NCOC] each operating at significant fields like Tengiz, Karachaganak, and Kashagan. Total natural gas produced by these three companies in 2023 accounted for around 85% of the total production in our country.

Kazakhstan's current utilization of natural gas is highly likely not fully capitalizing on its potential. According to our country’s natural gas balance between 2021 to 2023 presented below, a significant portion of the country's natural gas—about 34%—is used for reinjection into reservoirs to aid oil production, serving primarily an auxiliary function. The remaining 66% is largely consumed as fuel, with most processing focused on producing various fuel types. This indicates that the natural gas sector is predominantly engaged in low-profitability activities. Moreover, Kazakhstan lacks complex gas chemical processing facilities, which could otherwise be used to produce high-value industrial gases for sectors like semiconductors and electronics. This underutilization highlights the need for strategic development to enhance the economic value derived from the country's natural gas resources. Financial performance of Linde plc over the last three decades coupled with the expected spike in demand for industrial gases to produce electronics and semiconductors suggests that there is a solid potential for Kazakhstan to capitalize on the secular digitalization trend if the country leverages production of high-value industrial gases.

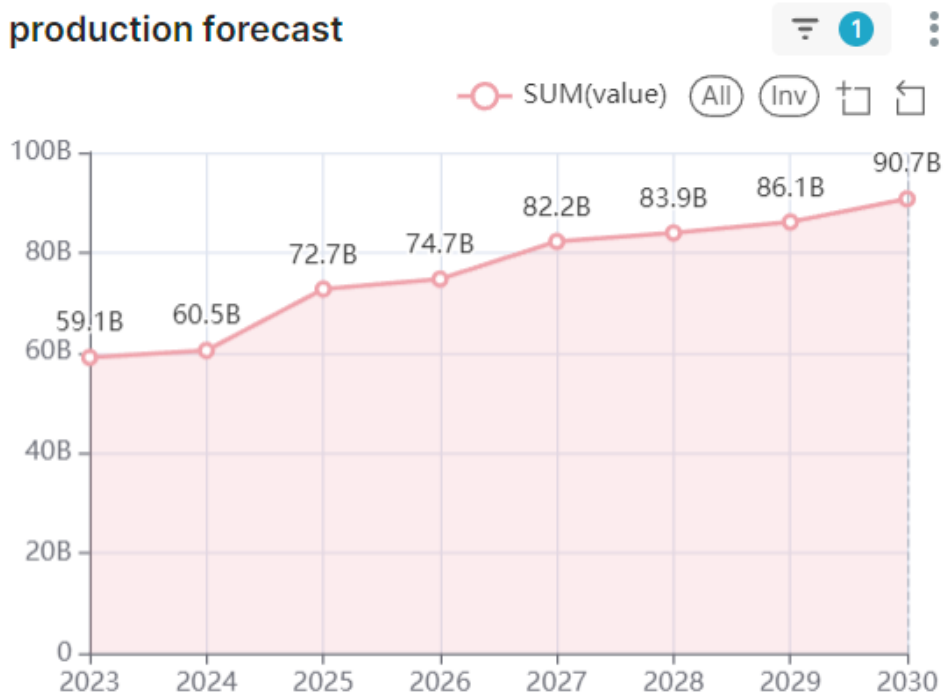
billion cubic meters

| Indicators | 2021 | 2022 | 2023 | Average weight |
|---------------------------------------|--------------|--------------|--------------|----------------|
| (+) Import | 2,29 | 1,34 | 0,90 | |
| (+) Net production, including: | 24,99 | 23,03 | 24,99 | |
| (+) Production | 53,82 | 53,24 | 59,96 | |
| (-) Reinjection | 17,33 | 18,73 | 22,18 | 34% |
| (-) Processing | 11,50 | 11,48 | 12,79 | 21% |
| (-) Total sales, including | 27,27 | 24,37 | 24,99 | |
| (-) Domestic market sales | 18,60 | 19,36 | 19,43 | 33% |
| (-) Export sales | 8,68 | 5,01 | 5,56 | 11% |

Source: Compiled based on data from the Analytical Platform EXia

The divergence between Kazakhstan's potential to increase natural gas production and its total gas balance dynamics over the past three years is a noteworthy trend. The chart below indicates that total gas production [before gas reinjection] is projected to reach approximately 3.2 trillion cubic feet [90.7 Bcm] by 2030, reflecting a robust 6.3% CAGR, according to the Ministry of Energy of the Republic of Kazakhstan. Meanwhile, the country's total gas production increased from 53.8 Bcm in 2021 to 60.0 Bcm in 2023, representing a 3.4% CAGR. This convergence suggests that while Kazakhstan has substantial potential to expand natural gas production, the processing infrastructure is currently insufficient to fully capitalize on this growth. The optimistic forecast may be hindered by processing bottlenecks, and unless these are addressed, the gap between production and processing capacities is likely to widen. The key problem is the economic unattractiveness of natural gas production and processing, as oil production companies do not have sufficient incentive to explore and extract natural gas other than associated one due to extremely low sales prices on the domestic market that give no chance for any meaningful return on investments.

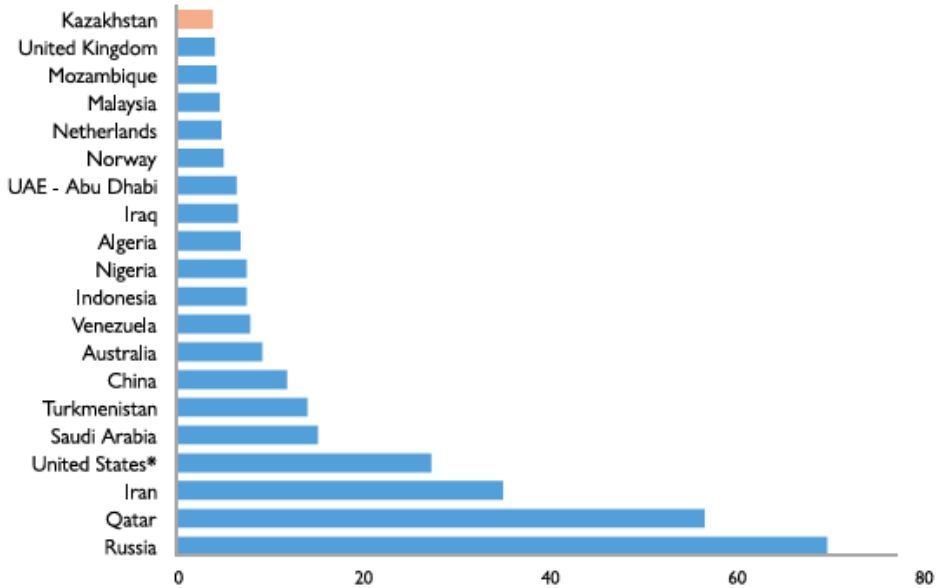
Gas production forecast



Source: Analytical Platform EXia

According to the National Energy Report 2023, Kazakhstan is among the top 20 countries by natural gas reserves. Data from the Analytical Platform EXia, based on information from the National Geological Service, the Precaspian Basin comprises around 88% of Kazakhstan's gas reserves and encompasses the three-supergiant oil and gas fields— Kashagan [48% of the country's total gas reserves], Karachaganak [26%], and Tengiz [14%] — the crown jewels in Kazakhstan's oil and gas industry. Two other important basins in the western part of the country—Mangyshlak-Central Caspian and North Ustyurt—possess more than 300 Bcm of recoverable reserves and have favorable exploration potential.

Figure 6.1 Top 20 countries by recoverable gas reserves (proven+probable) (Tcm)



Source: National Energy Report 2023

Therefore, in terms of natural gas extraction and reserves, Kazakhstan has a strong resource base. On the other hand, there is room for improvement from the processing domain’s perspective. There are five major gas processing plants [GPZ] in Kazakhstan, a number of smaller plants, and also an important arrangement for the processing of Karachaganak’s gas across the border at Russia’s Orenburg gas processing plant. Total capacity of Kazakhstan’s gas processing plants in 2023 was 38.8 Bcm/y with a utilization rate of 74%.

As we see, in contrast to North America, where natural gas processing capacity exceeds production volumes to ensure flexibility and efficiency, Kazakhstan faces the opposite challenge. The country’s processing capacity is limited and falls short of the volumes being produced, creating bottlenecks and limiting the full utilization of its natural gas resources.

Table 6.6 Kazakhstan's gas processing plants

| Gas processing plants | Capacity (Bcm/y) | Utilization in 2021 (%) |
|--------------------------------|------------------|-------------------------|
| Tengiz GPZ | 13.0 | 100% |
| Zhanazhol GPZ | 8.4 | 62% |
| Bolashak GPZ | 6.3 | 84% |
| Chinarevskaya GTU | 4.2 | 16% |
| KazGPZ | 1.5 | 60% |
| Shagyrlı GTU | 1.3 | 73% |
| Amangeldy GPZ | 0.7 | 49% |
| Akshabulak GTU | 0.6 | 67% |
| Targabatay GPC | 0.6 | 52% |
| Kozhasay GPC | 0.4 | 100% |
| Alibekmola GTU | 0.4 | 100% |
| Borankol GTU GPZ | 0.4 | 10% |
| Severny Nurzhanov GPZ | 0.2 | 100% |
| Karakuduk GPZ | 0.1 | 26% |
| Arystanovskoe GTU | 0.1 | 44% |
| Vostochny Makat GPZ | 0.0 | 100% |
| EmirOil | 0.0 | 87% |
| Balginbayev S. GPZ | 0.0 | 100% |
| Kulzhan GTU | 0.0 | 28% |
| <i>Kashagan GPZ (QazaqGaz)</i> | <i>1.0</i> | |
| <i>Zhanaozen GPZ</i> | <i>0.9</i> | |
| <i>KPO GPZ</i> | <i>4.0</i> | |
| <i>Kashagan GPZ</i> | <i>4.0</i> | |

Notes: Italicized means planned GPZ.
Source: S&P Global, QazaqGaz.

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Source: National Energy Report 2023

As we can see above, there is a processing plant Chinarevskaya GTU, which is operated by Zhaikmunai. This plant's utilization rate was extremely low at only 16% in 2021 due to the ongoing technical and commercial assessment by the operator KPO and Zhaikmunai regarding the potential use of Karachaganak gas for the plant. However, it appears that an agreement was not reached. Still, there is spare capacity for this large processing plant, which can be used for improving our country's gas processing potential. Moreover, four new gas processing plants are to be commissioned in Kazakhstan between 2026 and 2030: two at the Kashagan field with annual capacities of 1 and 2,5 Bcma, one at the Karachaganak field with a capacity of 4 Bcma, and KazGPZ in Zhanaozen with a capacity of 0.9 Bcma. All these projects will increase the total processing capacity of our country from 38.8 Bcma to 48.7 Bcma, which is a 25% growth.

A 25% growth in processing capacity looks impressive without context. On the other hand, as we have shown in one of the above charts, Kazakhstan's total annual natural gas production is expected to grow to 3.2 trillion cu.ft. [90.7 Bcm] by 2030 from 2.09 trillion cf [59.1 Bcm] in 2023. Therefore, total natural gas production is expected to grow by 53% between 2023 and 2030. This means that even with four new gas processing plants that are expected to be commissioned by 2030, the gap between Kazakhstan's natural gas production and processing capacity is poised to widen.

Kazakhstan has a developed network of gas transportation pipelines which enables to ensure the country's energy security. QazaqGaz is Kazakhstan's national gas operator, overseeing gas exploration, production, transportation, and distribution. Its subsidiaries manage a

network of gas pipelines that spans approximately 76,800 km, including 20,800 km of large-diameter pipelines with an annual capacity of 260 Bcm of gas. The company also operates gas distribution networks covering 65,686 km. Additionally, the transportation infrastructure features 32 compressor stations equipped with 319 gas pumping units and 248 gas distribution stations. QazaqGaz represents the state in significant gas pipelines operated through joint ventures with international partners.

Table 6.7 Kazakhstan's existing main gas pipelines as of 1 January 2023

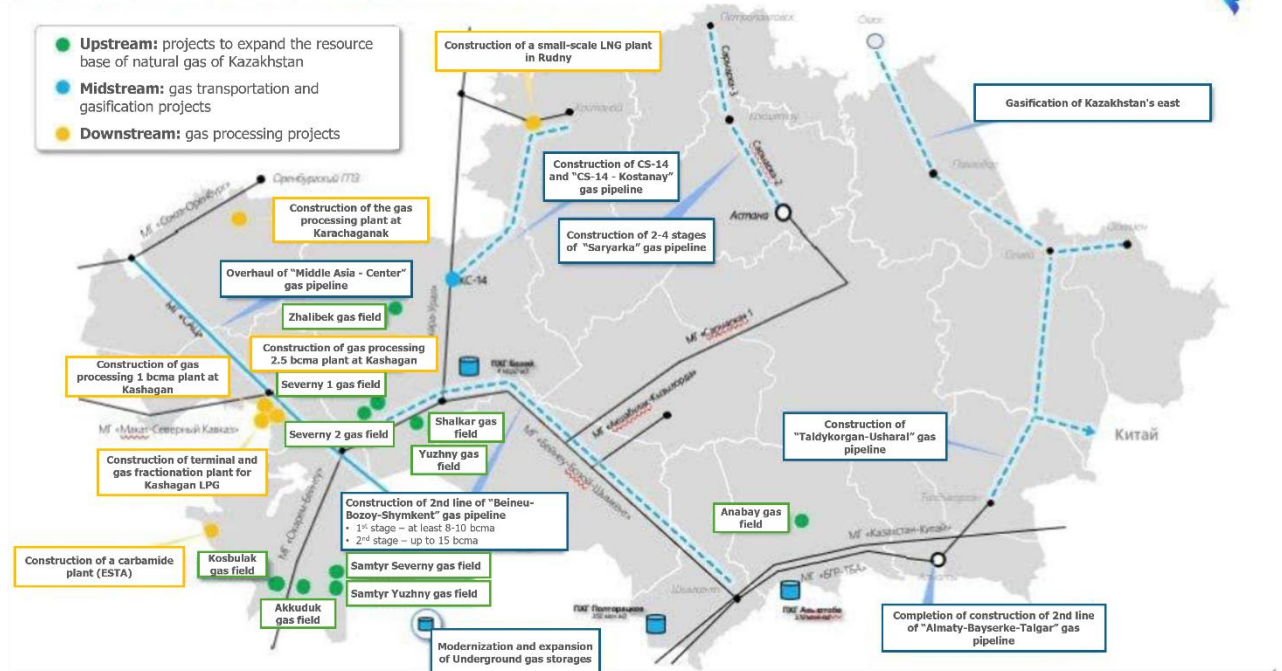
| | Estimated total pipeline length (km) on Kazakh territory | Estimated throughput capacity (Bcm/y) | Number of strings | Diameter (mm) |
|---|--|---------------------------------------|-------------------|----------------|
| Central Asia–Center (CAC)* | 3,961 | 42.7 | 5 | 1,020 1,220 |
| Central Asia–China Gas Pipeline (CAGP)** | 1,830 | 59.1 | 3 | 1,067 |
| Soyuz | 423 | 24.4 | 1 | 1,420 |
| Kartaly–Rudny–Kostanay | 156 | 1.6 | 1 | 820 |
| Orenburg–Novoposkov*** | 382 | 16.0 | 1 | 1,220 |
| Bukhara–Urals**** | 1,447 | 26.0 | 2 | 1,016 |
| Okarem–Beyneu | 545 | 7.2 | 2 | 1,015 |
| Beyneu–Bozoy–Shymkent | 1,450 | 15.0 | 1 | 1,067 |
| Akshabulak–Kyzylorda | 123 | 0.4 | 1 | 325 |
| Bukhara–Tashkent–Bishkek–Almaty (BGR–TBA)**** | 792 | 5.8 | 2 | 1,020 |
| Makat–North Caucasus | 371 | 22.0 | 1 | 1,420 |
| Gazli–Shymkent***** | 309 | 4.4 | 1 | 1,220 |
| SaryArka (Phase I) | 1,061 | 2.2 | 1 | 820 |

Source: National Energy Report 2023

The operation of Kazakhstan's gas transportation infrastructure faces significant challenges due to high deterioration rates, with many pipelines exceeding their designed lifespan and low throughput capacity. The core infrastructure, largely from the Soviet era, has an average wear rate of over 70%, necessitating extensive modernization efforts and upgrades, including new infrastructure projects and defect repairs. Despite ongoing improvements and increased gasification efforts, the system's age and condition continue to pose risks to efficient operation and capacity.

We have to give credit to QazaqGaz' management as the company is undertaking a number of projects to upgrade, strengthen, and build out gas infrastructure to facilitate the growth of gas consumption and to reach strategic gasification goals. However, the successful implementation of these numerous projects hinges on attracting serious, long-term investors. In the current challenging natural gas economy, securing such investment requires a balanced approach that aligns investor interests with the nation's broader objectives.

QazaqGaz's planned development projects 2024-2028



Source: QazaqGaz, adapted from Russian language

Bottom line

In conclusion, the global natural gas industry is well-positioned to thrive due to shifting energy dynamics and expanding opportunities in LNG and industrial gases. Kazakhstan, with its substantial natural gas resources and production capabilities, holds a strong strategic position. However, the country faces notable bottlenecks and challenges in processing and transportation. To capitalize on its potential, a comprehensive approach involving all key stakeholders—including the government, major industry players, and investors—is essential. There must be a concerted effort to expedite ongoing processing and transportation projects and to explore opportunities for capacity expansion to fully leverage Kazakhstan's natural gas potential. Moreover, expanding gas production will enable Kazakhstan to boost oil extraction, as gas is also injected into reservoirs to enhance oil recovery, importance of which was covered in our ["Crude Oil - Upward Trend"](#) article. Certainly, new solutions and approaches are needed to unlock the potential of our country's natural gas industry by addressing the complex energy trilemma—balancing security and accessibility, economic feasibility, and sustainability with carbon neutrality. Successfully navigating these constraints will ultimately define the future of Kazakhstan's energy security.

ENERGY Insights & Analytics

Analytical center "ENERGY" LLP (ENERGY Insight & Analytics) is a joint venture between [the KAZENERGY Association](#) and 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 in a kind of Software-as-a-Service.