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Commodity Insights

# Kazakhstan's National Energy Report 2023

KAZENERGY Eurasian Energy Forum and World Energy Congress

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# The National Energy Report 2023 (NER 2023): Goals, objectives, audience



- Provides analytical, internally consistent, and **independent** overview of major energy sectors in Kazakhstan
- NER 2023 analyzes key questions facing Kazakhstan's energy sector, such as:
  - What are the key elements involved in enhancing energy security for Kazakhstan?
  - How is Kazakhstan's energy sector embracing the energy transition and how is this interacting with energy security? What are the technological, political, and regulatory pathways for decarbonization and achieving carbon neutrality for Kazakhstan?
  - What progress has Kazakhstan made towards achieving its existing Paris Climate Agreement pledges for 2030?
  - What is the outlook for oil and gas production and consumption in Kazakhstan longer term, in the context of the energy transition, energy security, and OPEC+ obligations?
  - How is Kazakhstan managing the upcoming energy integration within the Eurasian Economic Union (EAEU)?
  - *What key issues should be considered in evaluating the need for a nuclear power plant in Kazakhstan?*
- Update of the main data on Kazakhstan's fuel and energy complex presented in previous National Energy Reports
- NER 2023 is intended for Kazakhstan's decision-makers and business leaders, potential investors, thought leaders, and the general public

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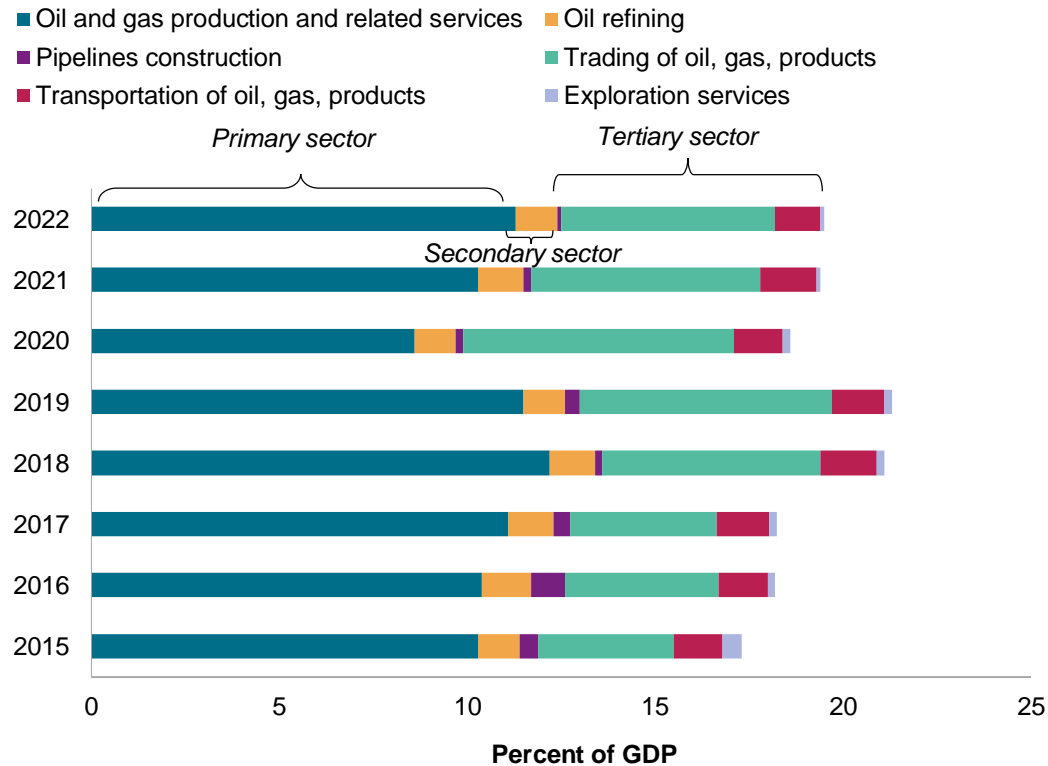
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The energy sector is a major part of Kazakhstan's economy: Outbreak of COVID-19 in 2020 brought worst economic contraction (-2.6% decline in GDP) since the 1990s post-Soviet collapse, but energy has also been driving the strong economic rebound since

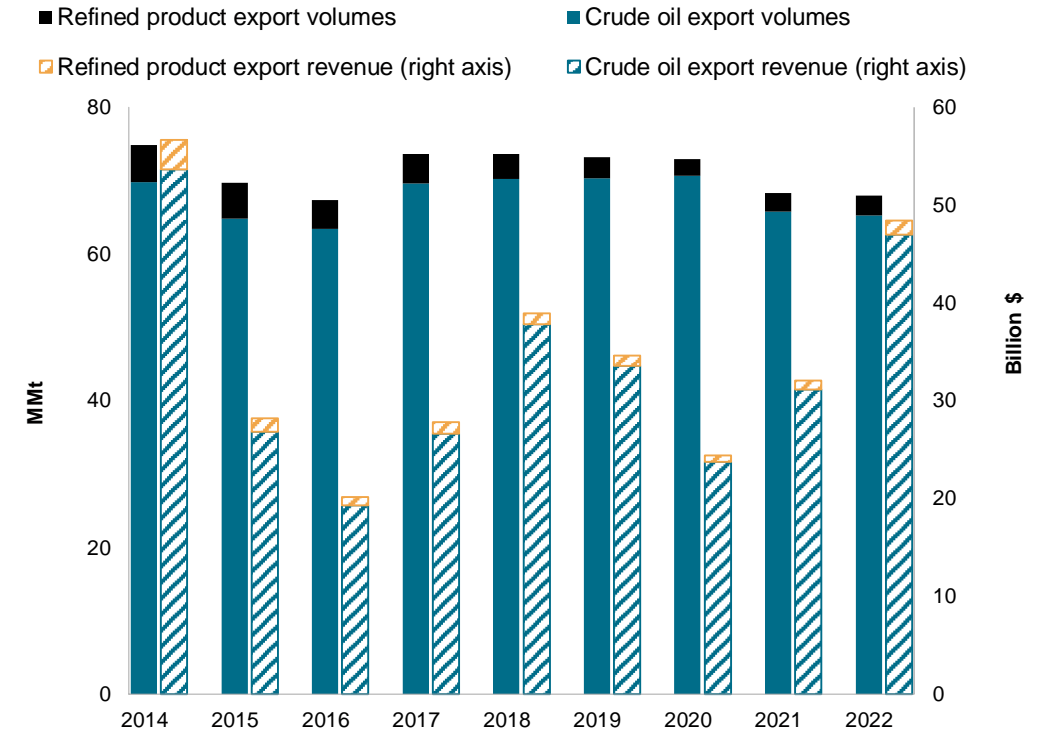
Kazakhstan's oil and gas industry contribution to GDP (percent)



Source: S&P Global Commodity Insights, Bureau of National Statistics RK.

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Kazakhstan's oil export volumes and revenues, 2014-22



Source: S&P Global Commodity Insights, Bureau of National Statistics RK (for export revenue).

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**The hydrocarbon sector generated about 20% of GDP in 2022; it was 23% in 2019 (contribution depends on production levels and global oil prices): Oil export volumes were not much different in 2022 than 2021, but oil export revenues jumped 51% to \$48.4 billion last year because of higher prices.**

## Global energy trends: The energy transition and energy security

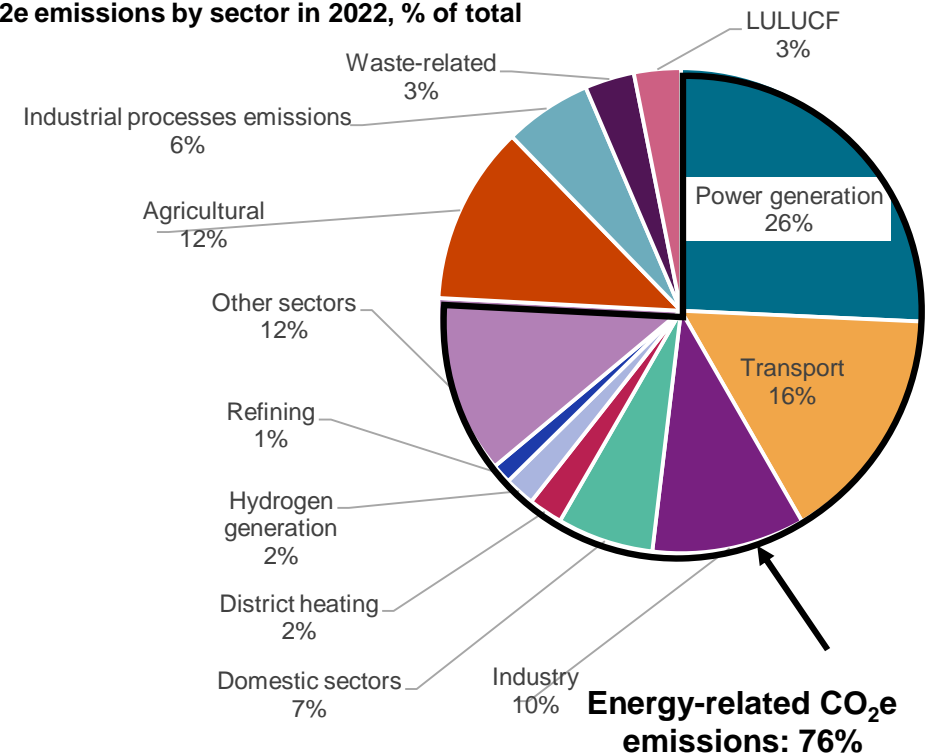
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- Energy transition from fossil fuels accelerating globally but viewed increasingly through an energy security perspective.
- Strong global energy demand recovery since 2020 and growing energy security concerns show that there is still a sizable role for oil and gas in the global energy balance through 2050.
- Global trend of tightening carbon regulation presents yet another impetus for broader modernization and systemic reforms of energy sector in Kazakhstan.
- Kazakhstan should articulate and adopt an official Energy Security Strategy document, guided by these general observations.

# The Energy Transition is a (protracted) process of moving to a lower carbon world to combat global climate change stemming from GHG emissions

- The ongoing energy transition (shifting consumption from fossil fuels, particularly hydrocarbons, to cleaner renewable types of energy) will be an extremely challenging, multi-decadal process that will require extraordinary changes in energy use, technology, and government policy.
- Energy use accounts for about 76% of total CO<sub>2</sub>e emissions globally, so the sector is under considerable pressure in efforts undertaken to ease climate “crisis.”
- Moving towards a lower carbon future will impact demand and supply of different fuel types in fundamental ways.
- Energy transition is now part of the general international energy context and lexicon.
- Decarbonization of energy use and other non-energy contributors (e.g., agriculture, industry) remains an urgent priority for many stakeholders.
- Pace of energy transition will be largely determined by government policies, but pressure from financial institutions, economics, technology advances, and public will also impact its rollout.

Global CO<sub>2</sub>e emissions by sector in 2022, % of total



Note: LULUCF = land use, land use change and forestry. Gt = billion metric tons of carbon dioxide equivalent; Total energy-related GHG is about 41.3 Gt CO<sub>2</sub>-eq.

Source: Source: S&P Global, IEA.

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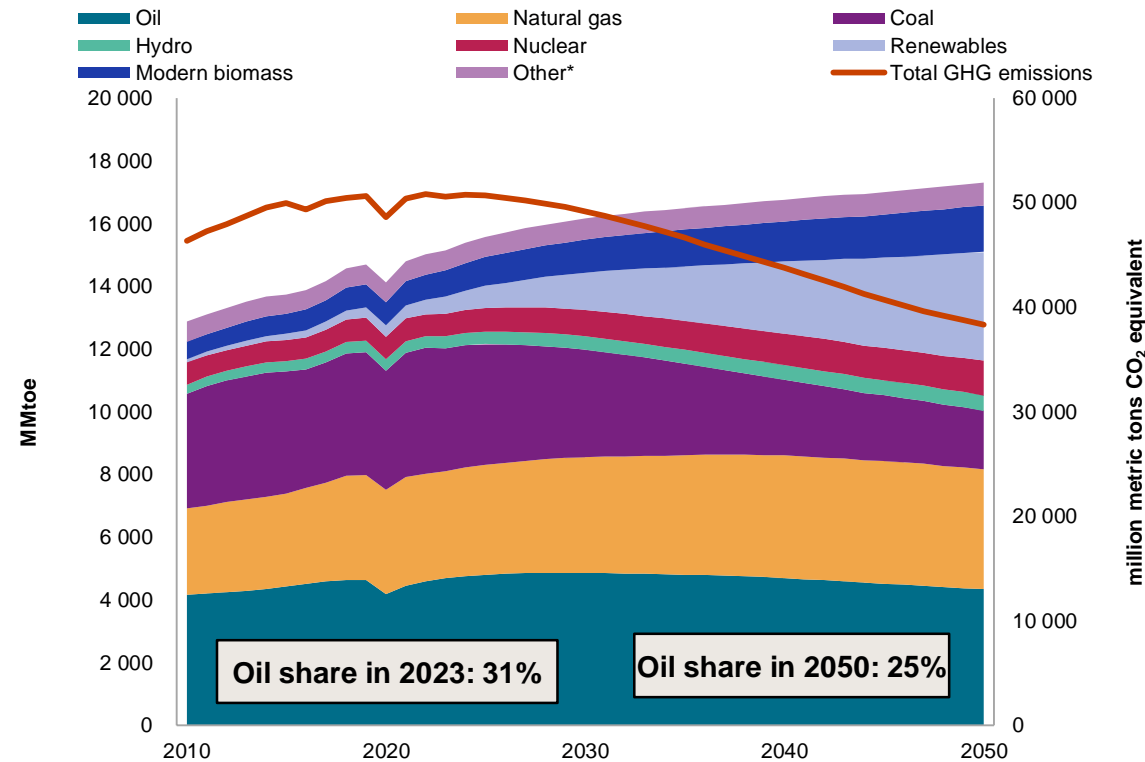
# The pace of the global energy transition is accelerating, but recent adjustments to our Inflections (base-case) outlook for global primary energy demand show a more prolonged role for hydrocarbons than in previous forecast

**Oil demand now plateaus about 2030**

**Gas demand continues to grow through 2050 (albeit slowly after retrenchment in 2022)**

**Oil and gas account for less than half (47%) of global energy demand in 2050; renewables grow to 20% (up from 15% in previous forecast)**

**Global primary energy demand and GHG emissions: Inflections**



\* Includes traditional biomass, solid waste, ambient heat, and net trade of electricity, hydrogen, and heat.

Source: S&P Global Commodity Insights.

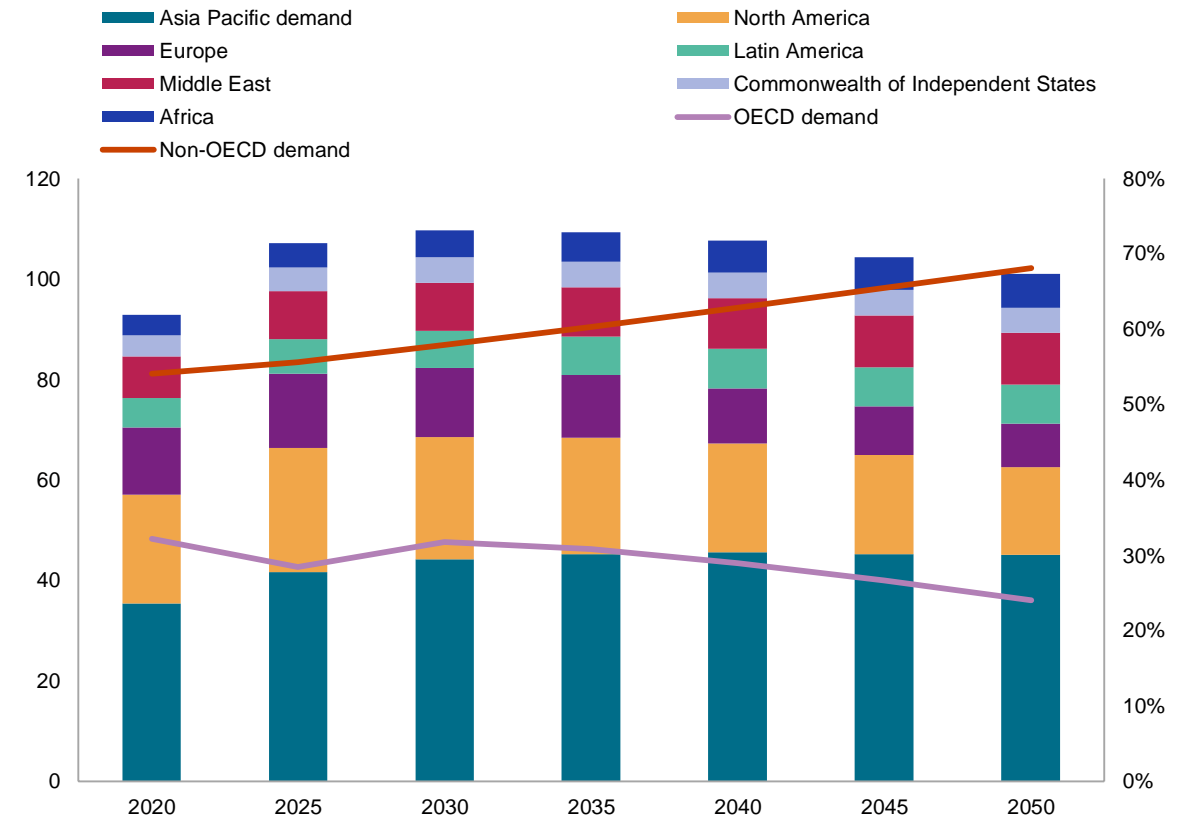
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- Sharp fall in fossil fuel demand in 2020 with COVID-19 pandemic
- Higher prices for fossil fuels in post-pandemic recovery period make it easier for renewables to compete
  - Although supply chain disruptions and high demand have led to much higher costs for renewables
  - Cost changes and new technology gradually reducing higher cost (premium) for “greener” options – e.g., cars, electricity, cement
  - Accumulation of years of policy support, technology development, and declining costs for wind, solar, and batteries
- Roll-out of government “green” plans: China, EU, Japan, South Korea, Brazil—and Biden’s election in the US
  - Proliferation of net-zero pledges by countries and international movement towards regulating carbon
    - Over two-thirds of global GHG emissions come from countries that have issued net-zero pledges .. and the share continues to rise
- Money flows: Away from oil, toward renewables
- Energy company commitments: Shifting from “big oil” to “big energy”

# Oil clearly will continue to play key role during the energy transition; total (liquids) demand expected to continue to grow in non-OECD countries through 2050

- Global oil demand increasingly bifurcated between developed and developing economies
- Non-OECD share of global liquids consumption rises from 54% in 2022 to 68% in 2050
- Asia Pacific market remains chief center of global oil demand growth longer term, supplied increasingly from outside the region
- Europe's indigenous crude oil production falls even more precipitously than liquids consumption, leaving Europe more dependent on oil imports to meet remaining (albeit declining) demand
- US oil demand also slowly contracts overall from late 2020s; its crude oil and gas condensate production reaches maximum in 2030 (~14 MMb/d)

World oil (liquids) demand outlook by region (million b/d)



Demand calculation includes biofuels and other synthetic oil; Mexico is included in North America.

Source: Historical data from the International Energy Agency, US Energy Information Administration, national statistical agencies; projections from S&P Global Commodity Insights.

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Disruptions in global trade flows and supply chains from upsurge in military conflict in 2022: Concerns about reliable access to energy in adequate quantities and at affordable prices have now put energy security at the forefront of most countries' national energy strategies

- **Typical measures undertaken to enhance energy security:**

- **Diversification** of supplies, markets, or transport routes to avoid heavy reliance on single source
  - This can also include selective international partnerships and “friend sourcing”
- **Enhanced resilience:** Allows national energy systems to recover effectively and quickly from unexpected events and disruptions; three components: fuel storage, reliability of the electrical grid, and political (policy) resilience (public support built through transparency and equitable access to affordable energy)
- **Transparency:** Sharing of information among countries and among participants shown to be highly effective; IEA: “good data allows markets to function, prevents panic, and deters the speculation that exacerbates price spikes, volatility, and shortages”

- **Many signs now point toward energy security concerns working in concert to accelerate the energy transition globally rather than retarding it**

- For Europe, the energy transition is synonymous with energy security, by reducing dependence on imported fossil fuels, and using indigenous resources like wind and sun together with domestic engineering and construction

# Key elements of an effective energy security strategy for Kazakhstan can be identified from major vulnerabilities

- Meeting domestic energy needs while keeping energy **affordable and widely available** to consumers; it also needs to make at least some material progress toward a cleaner energy future (for long-term sustainability)
- In achieving greater policy resilience, Kazakhstan's energy sector needs to function within a **broader market-economy framework**, allowing market supply and demand fundamentals to drive prices and allocate resources
  - Demonopolization may be needed in certain segments and activities to allow market forces to operate effectively
  - In other sectors, notably the natural monopolies (networked sectors), more effective and flexible regulatory approaches are needed for market forces to function
  - Adoption of a general open-trade stance internationally with respect to energy, to drive greater efficiency and market-oriented prices; this effectively entails general acquiescence to the emerging EAEU free-trade regime
  - Policymakers should limit state participation in domestic energy markets, intervening only selectively and judiciously
- **Diversifying export routes** for crude oil, to reduce the overall risk of adverse developments occurring on any single route or in any single export market
- **Reducing the role of coal, but carefully**; this low-cost, domestically available fuel provides essential ballast for the greater risks involved in the other elements of the overall energy transition
- **Expanding the role of natural gas**; it is one of the cheapest and most effective fuels for near-term decarbonization; but this may mean increased reliance on imports to achieve wider penetration
- Stimulating more rapid **improvements in energy efficiency**, thereby reducing the amount of energy needed
- In increasing the role of renewables in electricity generation, exercise proper caution to maintain **system reliability** and general affordability of electricity for consumers; this may require a revamping of the existing support scheme
- Energy security also includes maintaining **diversity among investor-countries and investor-types** in energy sector investment; this entails creating and maintaining an attractive investment environment given increased global competition

**Kazakhstan should articulate and adopt an official Energy Security Strategy document, guided by these general observations (this has to be a flexible document that can be modified to reflect changing circumstances).**

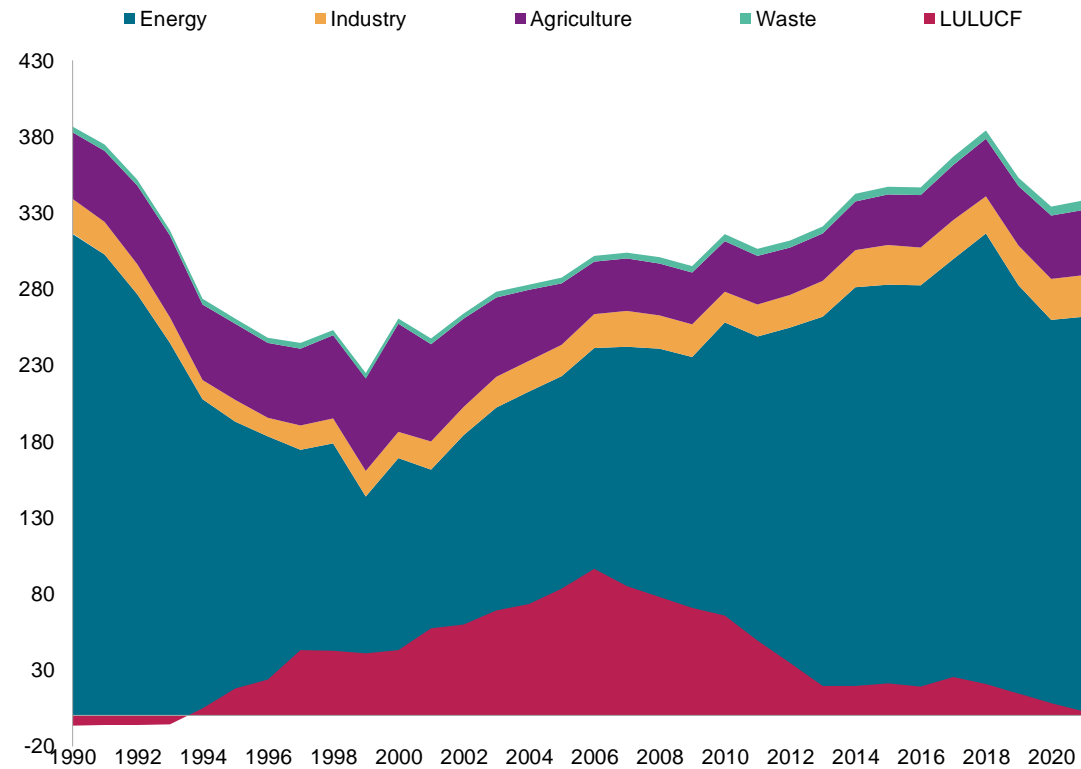
# Overview of energy transition and energy security issues in Kazakhstan

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- Kazakhstan's officially reported GHG emissions totaled 340.8 MMt CO<sub>2</sub>e in 2021, down 7% from 367.7 MMt CO<sub>2</sub>e in 2015.
- To achieve Kazakhstan's INDC (unconditional) emissions target of 324.4 MMt CO<sub>2</sub>e by 2030, this positive downward trend would have to continue and accelerate slightly; this is certainly possible if:
  - Gasification expands at an accelerated pace, displacing coal consumption
  - Already-sanctioned and already-programmed renewable projects materialize as planned
  - Energy efficiency improvements across the economy continue apace (or accelerate)
  - GHG emissions from non-energy sectors—industry, agriculture, LULUCF, and waste —also decline substantially
- Globally most countries are not presently on track to meet their Paris climate commitments. Given its current trajectory, Kazakhstan may not achieve its INDC conditional emissions target by 2030; national GHG emissions may even drift upwards in early 2020s with further economic recovery and higher energy consumption; a more concerted effort is needed to reverse this.
- The more ambitious goal of net-zero emissions by 2060 requires an even broader-based transformation of the entire economy

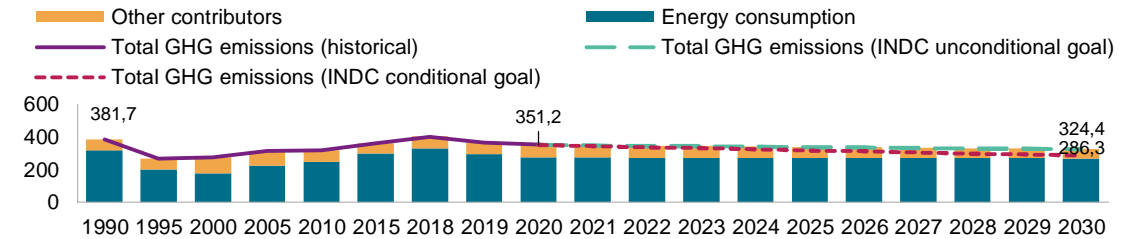
# Kazakhstan's total GHG emissions amounted to 340.8 MMt in 2021: Barring more expeditious and targeted action, Kazakhstan may miss its (unconditional) Paris Climate Agreement INDC goal for 2030 (of 15% reduction versus 1990)—324.4 MMt

Kazakhstan's historical GHG emissions by sector, MMtCO<sub>2</sub>e



Source: S&P Global Commodity Insights, UNFCCC  
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Outlook for Kazakhstan's GHG emissions: Energy use vs. other contributors (INDC compliant), MMtCO<sub>2</sub>e

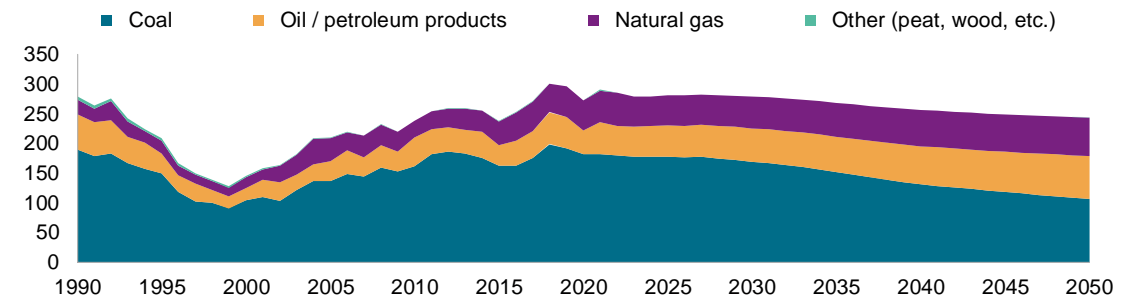


LULUCF = land use, land use change and forestry

Other contributors (non-energy use) include industry, agriculture, LULUCF and waste; GHG emissions in 1990 taken from Kazakhstan's 2022 NIR to the UNFCCC.

Source: S&P Global Commodity Insights.  
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Base-case outlook for GHG emissions from energy use in Kazakhstan, MMtCO<sub>2</sub>e



Source: S&P Global Commodity Insights.  
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**Our base-case energy consumption forecast envisions a decline in GHG emissions from just energy use of about 4% between 2022 and 2030**

# Several key policy “pathways” for decarbonization of economic activity

*A multitude of different approaches can be deployed, depending on local conditions*

## Energy efficiency



Policies stimulating investment in energy efficiency and modernization  
Policies for households  
Business sector policies

## Fossil fuel diversification



Solar, wind, and other renewables  
Carbon capture, use, and storage (CCUS)  
Nuclear generation  
Fuel switching to gas and retirement of coal-fired capacity  
Biofuels; hydrogen

## Electrification



Electrification of transportation system  
Substituting electrified rail for heavy-duty trucking (goods) and for aviation (people)  
Improved efficiencies  
Hydrogen production from renewables

## Carbon offset options

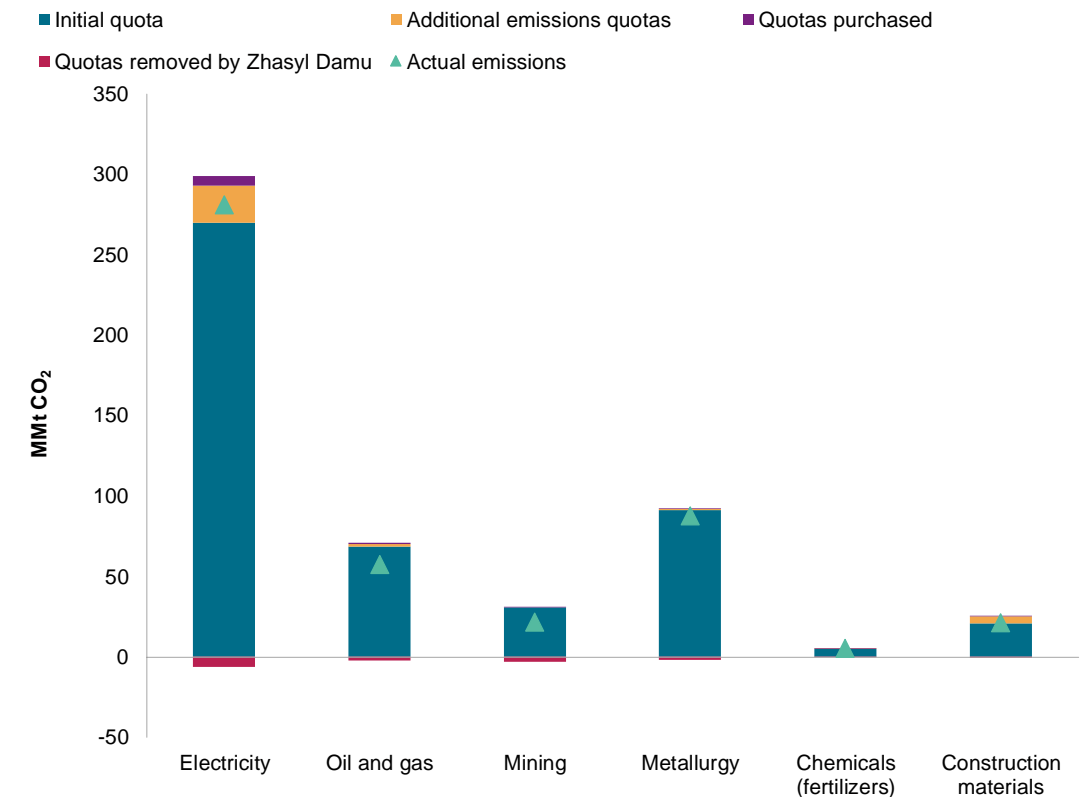


Voluntary carbon markets  
Compliance-based markets  
Investments in nature-based environmental projects to absorb carbon

## Kazakhstan's carbon trading system (ETS) for CO<sub>2</sub> emissions relaunched in 2018, and now in its “5<sup>th</sup> phase” of operation; Generally lackluster results (especially as an instrument for CO<sub>2</sub> reduction) show the need for further refinement going forward

- Kazakhstan's ETS, overseen by Zhasyl Damu, is a “cap-and-trade” system analogous to EU ETS; it was relaunched in 2018 after an initial experiment in 2013-15; it covers all major technological installations (nearly 220) across six major sectors (power, oil and gas, metallurgy, and construction materials); these participating entities account for about 50% of Kazakhstan's total CO<sub>2</sub> emissions
  - Electricity companies among most actively participants in trading; they most frequently exceeded their initial emissions quotas (initial quotas set too low)
  - Most upstream oil and gas operators complied with quotas; midstream operators had lowest compliance (initial quotas set too low)
  - Mining sector's quotas were probably too generous from outset, as they easily remained within them
- Kazakhstan's ETS requires further fine-timing for improved effectiveness; current operation is not a transparent market-based mechanism
  - Few trades and the resulting carbon prices very low without any fluctuations
  - Broader coverage beyond CO<sub>2</sub> to other GHGs; increase coverage to other sectors?
  - Greater transparency on quota allocation mechanisms needed; companies seemingly able to secure additional quotas rather than actively trade or reduce their emissions; introduce auction system for rising share over time of initial allocations?
  - Actual emissions of entities not publicly accessible
  - Existing company procurement practices, rules largely preclude flexible carbon trading

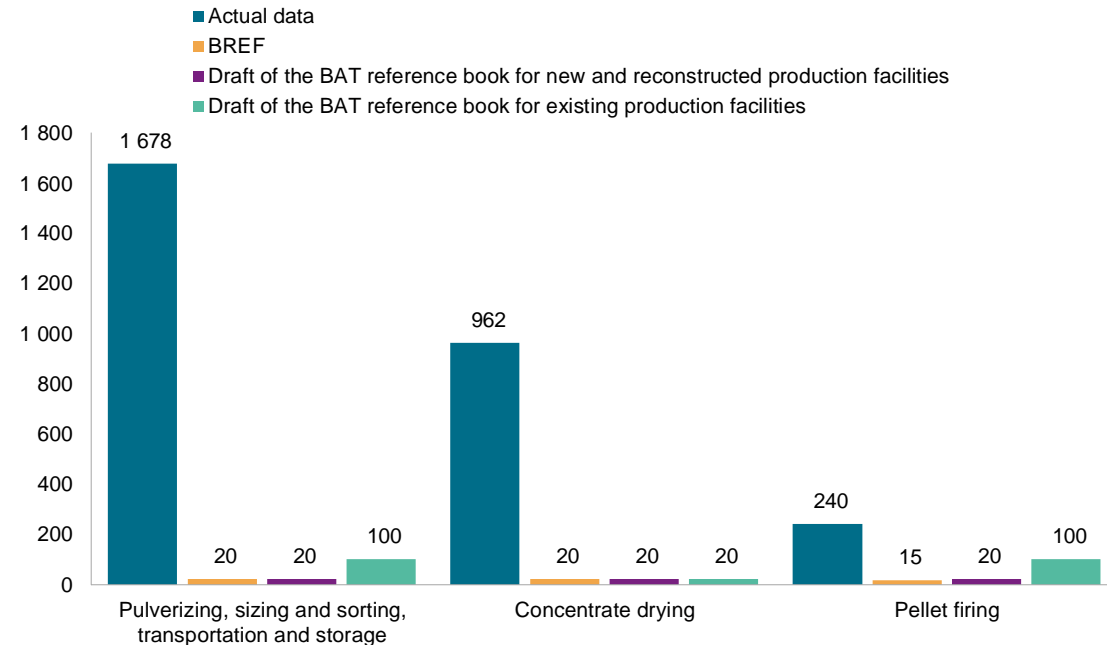
Sectoral performance under Kazakhstan's ETS, 2018-20



Source: S&P Global Commodity Insights.  
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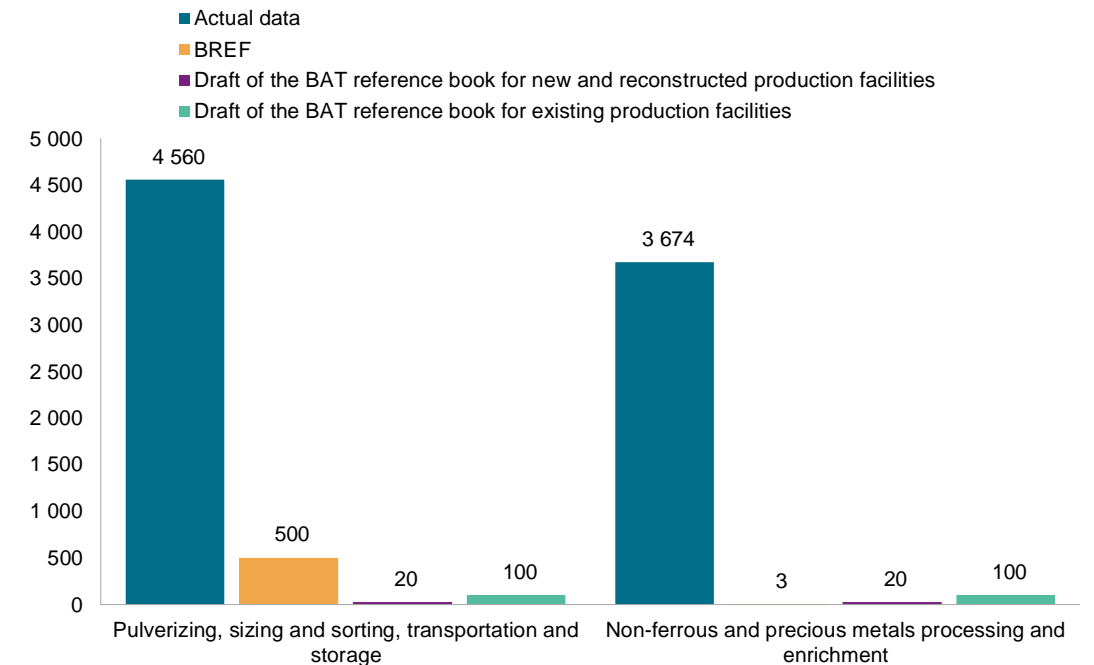
# BAT: An important mechanism for emissions reduction introduced through the 2021 EcoCode, with tougher EU standards guiding benchmarks being set for enterprise operations

**Particulate (dust) emissions from iron ore (including other ferrous ores) production and processing, mg/nm<sup>3</sup>**



Source: S&P Global Commodity Insights, IGTIC  
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**Particulate (dust) emissions from non-ferrous metal ores (including precious metals) production and processing, mg/nm<sup>3</sup>**



Source: S&P Global Commodity Insights, IGTIC  
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**In adopting BAT principles and standards from EU practice, it is important to recognize that many of the parameters are currently unattainable by Kazakhstan; therefore, localized transitional measures are needed that reflect this reality, such as extending implementation times and softening some technological indicators; one example would be a differentiated approach for permissible emissions between new and existing production facilities.**



# Kazakhstan's oil industry: Major accomplishments and challenges as multi-vectoral policy is reemphasized to diversify oil export routes

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## Accomplishments:

- Notwithstanding the 2022 downturn (mainly from periodic export limitations), national oil output has remained resilient overall in the face of multiple shocks; production is poised to return to a growth trajectory in 2023, reaching a maximum level in the mid-2020s in the S&P Global base case outlook.
- Kazakhstan has moved to mitigate the emerging Russia transit risks (associated with the escalation of armed conflict in Ukraine), through some diversification of oil export routes (e.g., resumption of regular exports via the Baku-Tbilisi-Ceyhan pipeline) and differentiating Kazakh-origin oil from Russian oil export on Transneft export routes (KEBCO rebranding).
- Kazakh authorities remain officially committed to a gradual transition to market-based refined product prices, in keeping with the Eurasian Economic Union (EAEU) goal of launching a common market in oil and refined products in 2025 (e.g. raising the ceiling on gasoline and diesel prices).

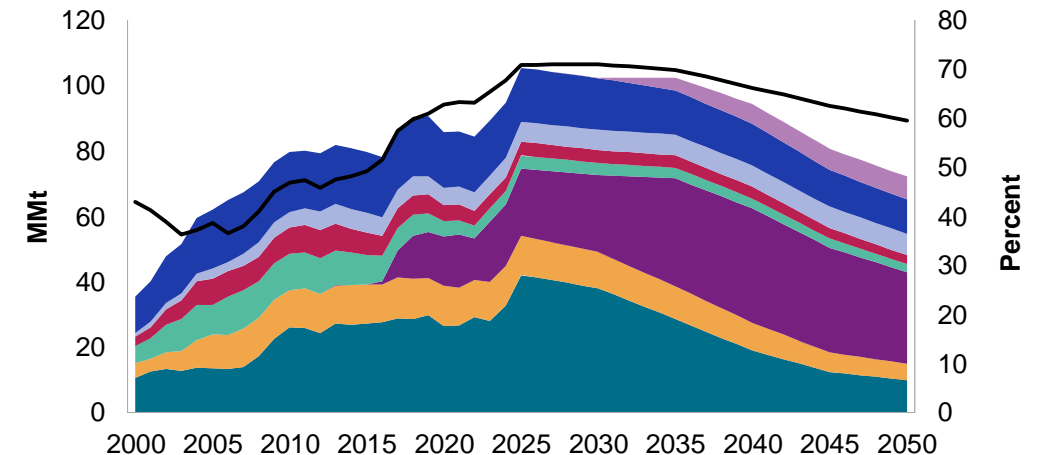
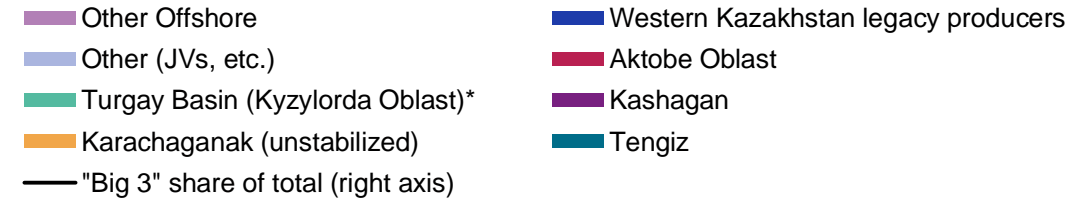
## Challenges:

- Relatively high upstream oil production costs (including a high government tax take), rigid local content rules and other above-ground obstacles continue to challenge upstream economics and investment longer term.
- Achievement of Kazakh authorities' aspirational target for a several-fold increase in trans-Caspian export volumes, raising such exports to about a quarter of estimated Kazakh export volumes in a few years' time, will be constrained by high transportation costs along with infrastructure constraints.
- The pace of price liberalization needs to accelerate for Kazakhstan to meet its EAEU integration commitments — and avoid chronic shortfalls in the supply of crude oil to Kazakh refineries and products to the domestic market.

# Kazakhstan's oil production expected to reach maximum level already by mid-2020s; "Big 3" projects remain key drivers of overall trajectory

- National oil production expected to grow to around 105 MMt by mid-2020s, and then slowly decline.
- "Big 3" remain key drivers of overall trajectory (rather than Kazakhstan's OPEC+ quota); their share of total Kazakh oil output is expected to rise from around 63% in 2022 to a maximum of 71% in 2030, but then drift down to 60% by 2050.
  - **Tengiz:** Future Growth Project is main source of Kazakhstan's incremental oil production during 2024-25.
  - **Kashagan:** Phase 2 development is likely to lift project output through 2030s, cushioning overall national production decline trajectory.
  - **Karachaganak:** Production remains near current plateau through 2030, with help from gas reinjection project completed in mid-2020s.
  - But uncertainty of multi-billion-dollar arbitration proceedings launched by ROK against Kashagan and Karachaganak consortia in 2023 probably curbs IOC appetite for incremental upstream investment.
- KazMunayGaz legacy assets expected to experience a decline longer term but attenuated with progressive implementation of new technologies for mature fields.
  - Including hydraulic fracturing, horizontal drilling, steam and polymer injection.
- Smaller, independent oil producers could play much greater role in Kazakhstan than currently envisioned if business conditions for them could be improved; they hold sizable aggregate reserve base and have ample potential for new discoveries.

## Outlook for Kazakhstan's oil production by major project/region to 2050 in the base case



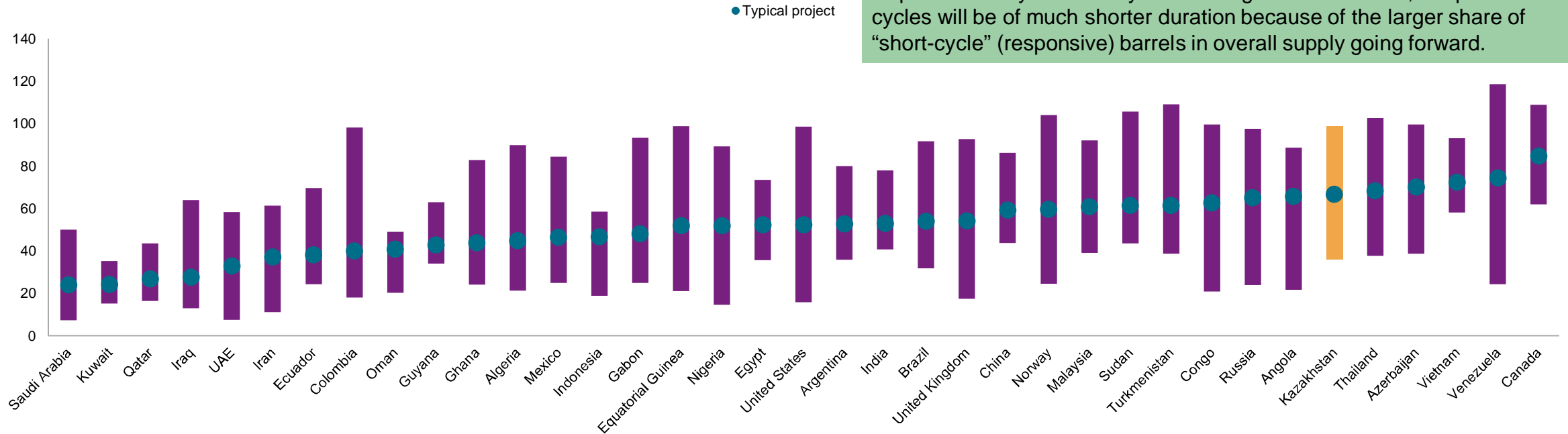
\* Includes Amangeldy in Zhambyl Oblast.

Source: S&P Global Commodity Insights (Eurasian Oil Export Outlook).

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# Does Kazakhstan have “advantaged” barrels that allow it to remain important in global oil supply? Most sources of projected incremental global crude oil supply (through 2040) break even below \$50/bbl Brent (in constant dollars)

Full-cycle costs in terms of Dated Brent for selected oil-producing countries in 2022 (\$/b)



Our expectations for average annual oil prices longer term reflect fundamental supply and demand conditions (~\$75/b real); we still expect oil price volatility to be a key feature of global oil markets, but price cycles will be of much shorter duration because of the larger share of “short-cycle” (responsive) barrels in overall supply going forward.

UAE = United Arab Emirates.

Assumes a 20% rate of return.

Source: S&P Global Commodity Insights.

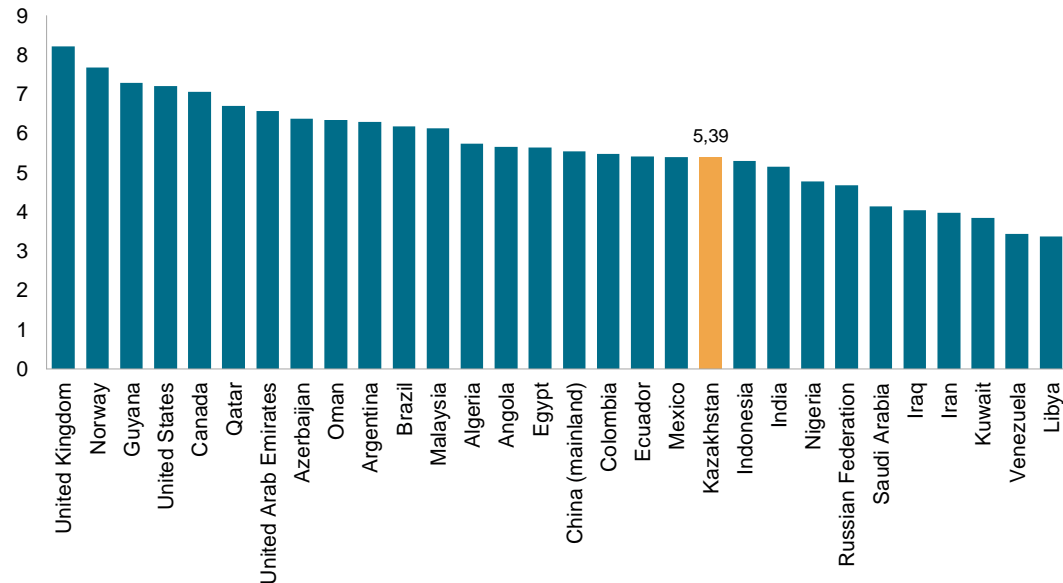
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**Kazakhstan’s barrels are not the most expensive in the world to produce, but most of its “new” barrels still lie at the high end of the global cost curve.**

# Overall investment attractiveness is critical for attracting upstream investment globally as companies increasingly seek “advantaged” barrels

*Although Kazakhstan’s ranking has improved over last decade, it is currently ranked only 78th out of 112 markets in PEPS rankings, driven largely by the country’s poor fiscal rating (high tax take and low operator profitability); it also compares unfavorably with “peer” countries with which it is competing with for investment*

**S&P Global's E&P attractiveness ratings of selected oil-producing countries for Q3 2023: Above-Ground Focus weight profile**

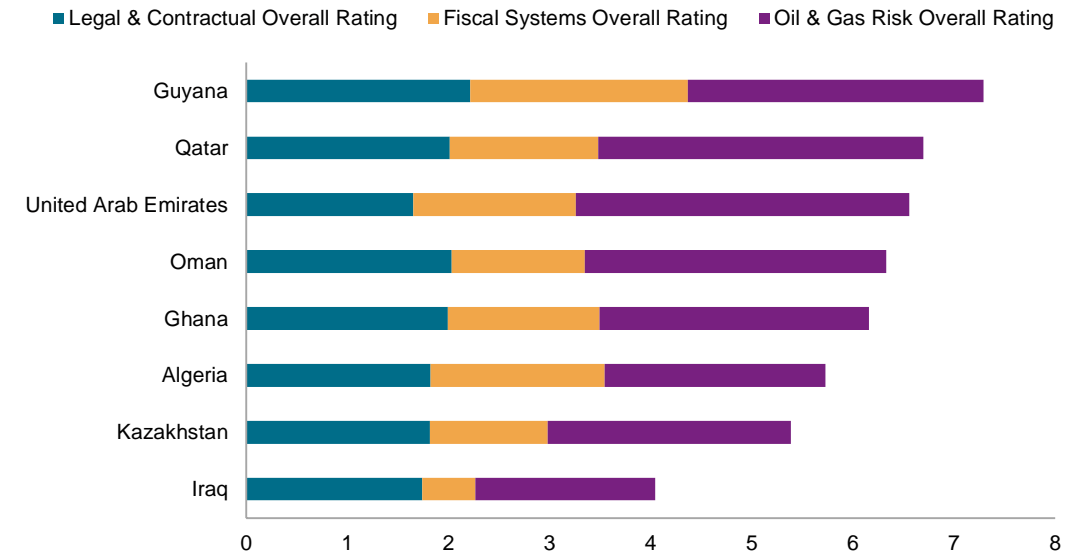


Notes: Ranking as of third quarter 2023 for 30 largest crude oil producers in 2022. The overall E&P attractiveness (Above-Ground Focus weight profile) score is based on a weighting of the key sub-components of the rating as follows: Legal and Contractual (30%), Fiscal Systems (30%), Oil & Gas Risk (40%).

Source: S&P Global (PEPS).

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**Kazakhstan peer group E&P attractiveness ratings for Q3 2023: Above-Ground Focus weight profile**



Notes: The overall E&P attractiveness (Above-Ground Focus weight profile) score is based on a weighting of the key sub-components of the rating as follows: Legal and Contractual (30%), Fiscal Systems (30%), Oil & Gas Risk (40%).

Source: S&P Global (PEPS).

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**Petroleum Economics and Policy Solutions (PEPS) Index - assesses not only fiscal terms but other factors important for upstream investment.**

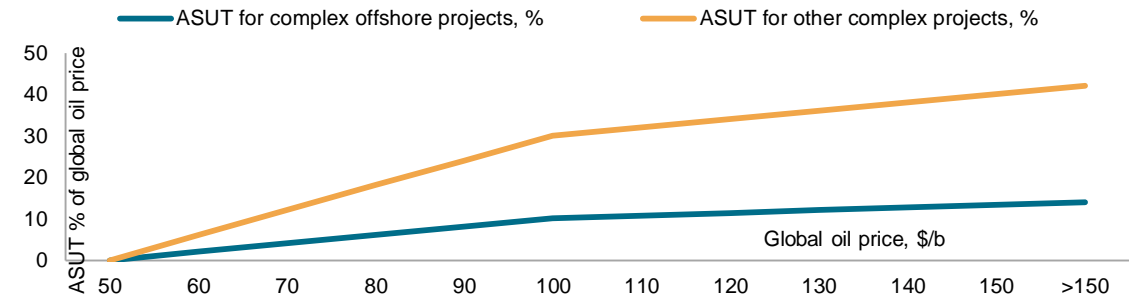
# Kazakhstan's Improved Model Contract: Probably insufficient to incentivize major new upstream projects by international investors, including natural gas production

- In January 2023, Kazakhstan's long-awaited Improved Model Contract (IMC) for complex fields went into effect
- IMC defined three categories of complex fields:
  - Offshore fields that are fully or partially located in the Kazakh sector of the Caspian or Aral seas
  - Onshore fields where hydrocarbons are subject to certain complex conditions (high depth, high pressure, contains hydrogen sulfide, has unconventional reserves, has thick salt layers, etc.)
  - Onshore gas projects, including gas or gas condensate projects where oil-saturated deposits account for less than a quarter of the total volume of hydrocarbons
- The IMC applies to implementation of new "complex" projects (even if the actual reserves have already been discovered)
- IMC offers some preferential regulatory and fiscal terms:
  - Stability of certain contract terms and fiscal preferences (but not all)
  - Kazakh or international forum selection option in dispute settlements
  - Option to export any or all produced liquids from the field
  - For onshore gas projects, guarantees of stability of the clause in the reduction of corporate income tax by up to 100%
  - Simplified fiscal regime, using Alternative Subsoil Use Tax (ASUT)
  - Updated gas price calculation methodology
  - Increased permitted depreciation amounts for CAPEX
- IMC also specifies many additional obligations of the subsoil user, which if unfulfilled could result in fines and other strictures up to contract termination
  - Local content requirements for specialists and workers of at least 70%
  - Mandatory creation of a program to develop local suppliers of goods, works, and services during the production period, approved and overseen by the competent authority
  - Obligation to develop and fulfill the work program indicating the scope, type, and timing of exploration work broken down annually
  - Additional obligations of the Subsoil User in case of a large discovery (>100 MMt of oil or 50 Bcm of natural gas)

# Policy reforms—including IMC—so far stop short of major improvements to business climate needed to incentivize large-scale new upstream investment

- Improved Model Contract (IMC) aims to create conditions for attracting additional investment in exploration and development of complex upstream projects, but S&P Global concludes that the IMC terms probably do not go far enough to stimulate additional upstream spending on the scale sought by Kazakhstan.
  - At the beginning of 2023, amendments and additions were completed to the relevant legislative acts in Kazakhstan, introducing the IMC — a new subsoil contract option.
  - The IMC is applicable to offshore and gas projects as well as to complex onshore projects and provides some incentives (“preferences”) that reflect a recognition by the Kazakh authorities of the special challenges involved in the development of its complex hydrocarbon fields.
  - But the IMC retains many aspects of the typical (existing) model contract (Subsoil Use Contract) that applies to less complex fields, and has some of the same limitations; e.g., both sorts of contracts include language that lacks clarity and transparency — for example, regarding local content rules.
- Sign of the times: Online auction results continue to fall short of expectations.
  - Starting in 2020, Kazakhstan has been holding online auctions of E&P acreage, following Subsoil Code amendments to allow for this form of licensing.
  - IOCs have yet to participate, though one leading foreign NOC, Sinopec, bid in the December 2022 auction (and won an exploration block in the Precaspian Basin).

ASUT tax rates for complex offshore projects versus other projects



Source: S&P Global Commodity Insights, Kazakhstan Tax Code Article 768.  
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Key indicators for Kazakhstan's online auctions for E&P blocks, 2020-23

Indicator	Dec 2020	Apr 2021	Nov 2021	Jul 2022	Dec 2022	Jul 2023	Totals, averages
Number of completed auctions	5	8	14	13	20	9	69
Average contract license area, sq km	3,014	280	906	756	992	482	1,072
Total value of contracts, million USD	28	19	146	27	60	24	304

Source: S&P Global Commodity Insights, Ministry of Energy RK.

Kazakhstan’s traditional “multi-vectoral” approach remains best option for minimizing transit risks, since all routes involve trade-offs of one kind or another

Comparative advantages of selected alternative outlets for oil exports from Kazakhstan				
	Caspian Pipeline Consortium	Atyrau-Samara Pipeline	Kazakhstan-China Pipeline	Baku-Tbilisi-Ceyhan
Above-average netback*	✓	✓	✗	✗
Ample spare capacity (from the Kazakh border)	✓	✓	✓	✗
Access to multiple markets	✓	✓	✗	✓
Quality bank	✓	✗	✗	✓
Minimal or no transit state risk	✗	✗	✓	✓**

\*Above-average netback compared with estimated netbacks for most of the alternative routes available to exporters from Kazakhstan.

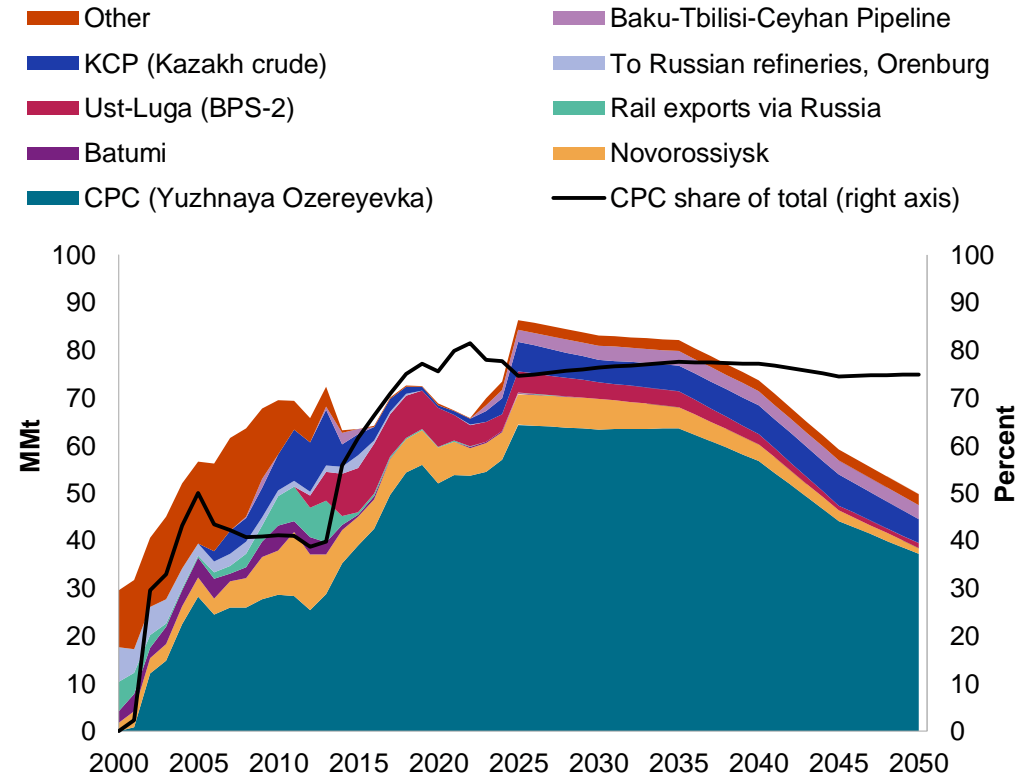
\*\*Although BTC bypasses Russia, the route involves transit of Kazakh oil exports through three countries (Azerbaijan, Georgia, and Turkey), and a number of territorial disputes involving these countries remain unresolved (in particular, the disputes between Azerbaijan and Armenia and between Georgia and Russia).



# CPC will remain Kazakhstan's primary oil export channel; but recent route diversification push spells greater trans-Caspian volumes, although that route's high transportation costs limit upside

- The CPC pipeline, handling over 80% of Kazakh oil exports, will remain the chief export route for the foreseeable future, but new geopolitical factors are adding impetus to route diversification to reduce its overall share.
  - Several interruptions since the launch of the Ukrainian invasion have underscored rising Russia transit risks.
  - But the recently completed CPC debottlenecking program raises the prospect of increased Kazakh exports via CPC in near term.
- Atyrau-Samara (Transneft) pipeline routes to Black Sea, Baltic Sea and Druzhba outlets also remain viable.
  - KEBCO rebranding in June 2022 differentiated Kazakh crude stream from Russia-origin crude (quality remains identical to Russia's Urals Blend).
  - Kazakhstan also began exporting oil via the Druzhba pipeline (to Germany) in February 2023 for the first time since 2012.
- The Kazakhstan-China Pipeline (KCP) was main non-Russian route for Kazakh oil exports in 2022.
  - KCP remains substantially underutilized, as it tends to yield relatively unattractive netbacks given fixed China border price at discount to an international benchmark and provides access to one market (and buyer).
- Trans-Caspian routes bypass Russia and also reach multiple global markets — especially Baku-Tbilisi-Ceyhan (BTC) pipeline — have emerged as the main focus of the latest phase of Kazakhstan's oil export route diversification effort.
  - But high transportation costs, infrastructure constraints impede ramp-up of volumes to the much higher levels envisioned by Kazakh officials.

## Outlook for Kazakhstan's crude oil exports to 2050 by route

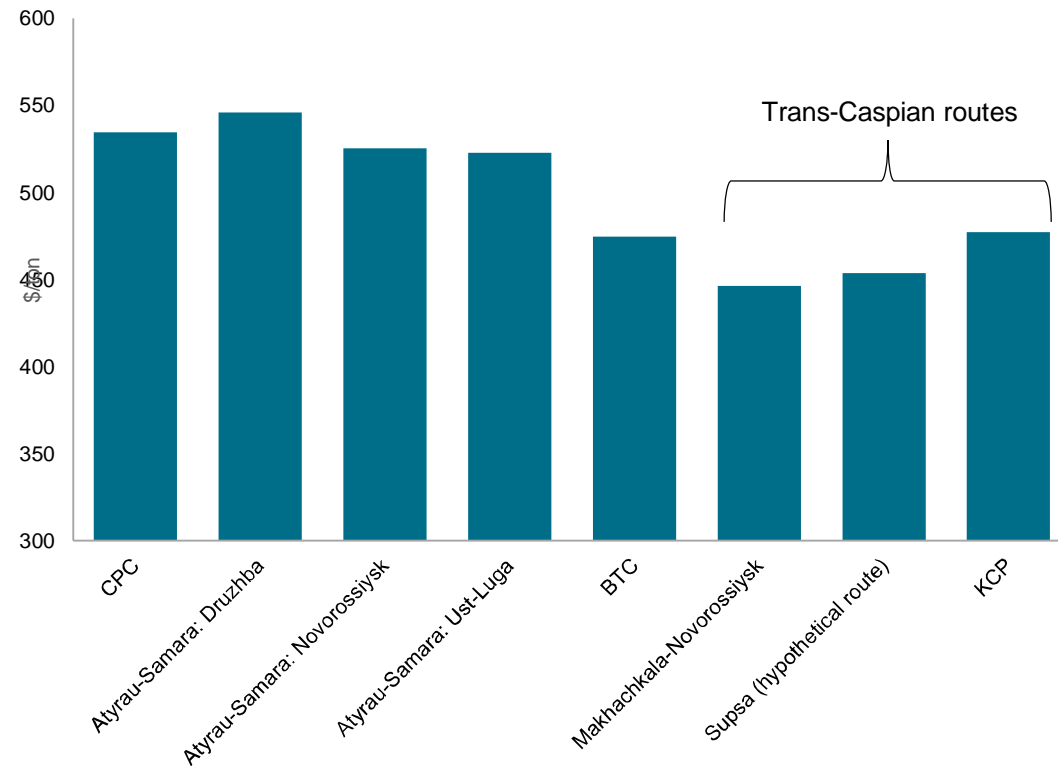


Source: S&P Global Commodity Insights (Eurasian Oil Export Outlook).

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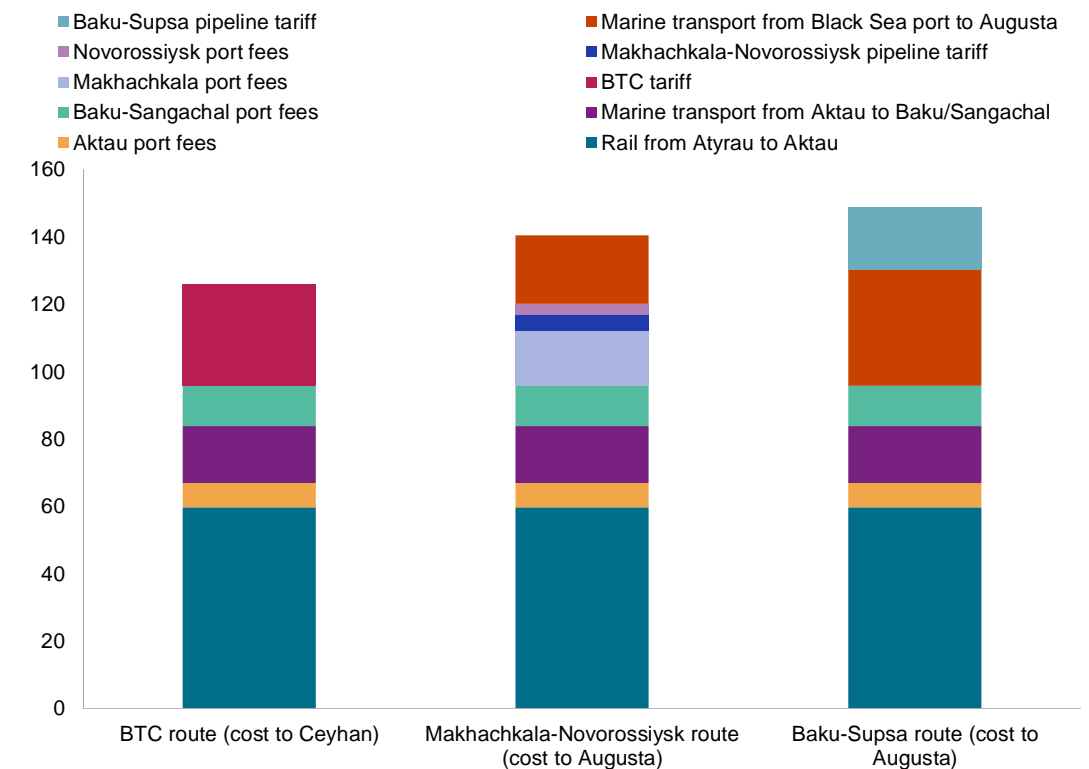
# The netback factor: Trans-Caspian routes face combination of logistical and other challenges that negatively impact export economics

Estimated Kazakh crude oil export netbacks from Atyrau via selected routes in March 2023



Source: S&P Global Commodity Insights.  
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Estimated breakdown of transportation costs for Kazakh oil exports from Atyrau via selected trans-Caspian routes in March 2023, \$/ton



Source: S&P Global Commodity Insights, Argus Media Limited.  
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**Some Trans-Caspian cost elements could be greatly reduced by construction of new infrastructure (e.g., an onshore pipeline between Atyrau and Aktau instead of rail) and expanded volumes on larger tankers (e.g., cross-Caspian marine freight and terminal charges).**

# Oil balance outlook to 2050: Longer term, domestic market (refineries) will claim a larger share of (smaller) oil production volume at expense of export markets

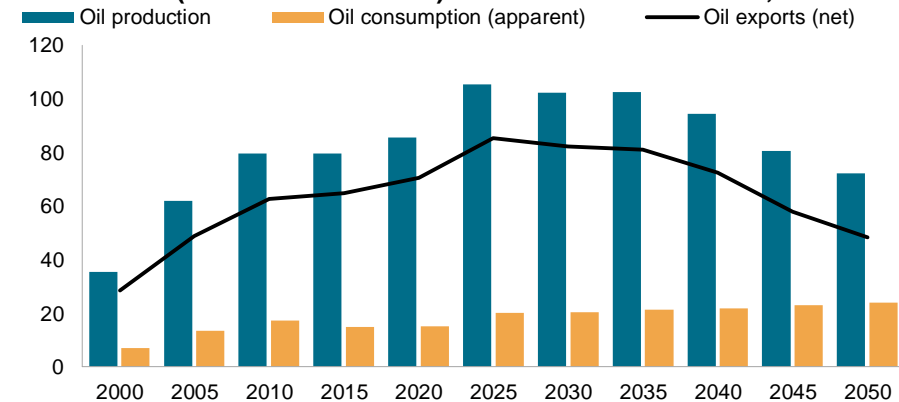
## • Oil (crude+condensate) balance dynamics:

- S&P Global base case is for Kazakh oil production to continue growing only through mid-2020s, after which a slow but steady decline sets in, leaving national liquids output roughly 14% lower in 2050 than in 2022.
- The bulk of oil output continues to be directed to export markets, but net export volumes contract (along with aggregate oil production) longer term, falling by 26% during the outlook period alongside a 25% increase in domestic apparent (crude) oil demand; as a result, the share of total production directed to export markets declines from 77.4% in 2022 to about 67% in 2050.

## • Refined product balance dynamics:

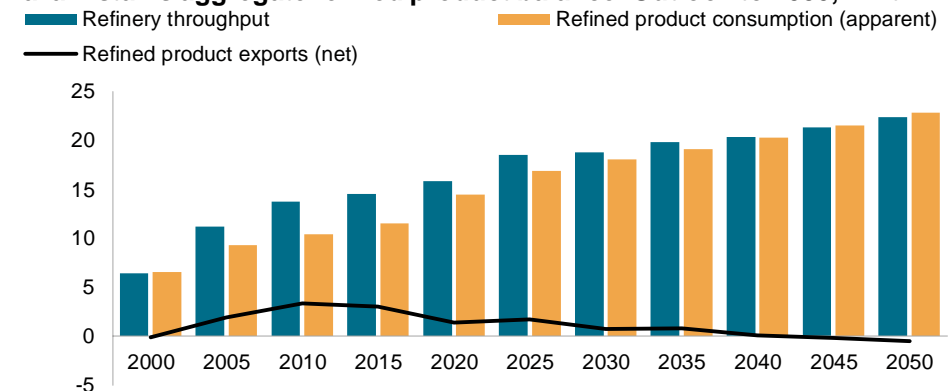
- Our base-case scenario is for an ongoing rise in refinery throughput through 2050 (reflecting rising domestic product demand); this lifts total runs by around 24% to 22 MMt; continued (albeit slower) expansion in domestic apparent refined product demand results in a figure about 43% higher in 2050 at 22.8 MMt.
  - Main underlying driver in consumption growth is motor fuels: diesel, jet kero, and motor gasoline
- Regionally, the pattern of product demand growth indicates that a sizable expansion of annual throughput capacity at the Shymkent plant for crude distillation — by at least 3 MMt/y — is required in late 2020s or early 2030s, while only minor “capacity creep” is needed at Pavlodar and Atyrau (through selective debottlenecking and improvement of operational efficiencies).

Kazakhstan's oil (crude + condensate) balance: Outlook to 2050, MMt



Source: S&P Global Commodity Insights.  
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Kazakhstan's aggregate refined product balance: Outlook to 2050, MMt

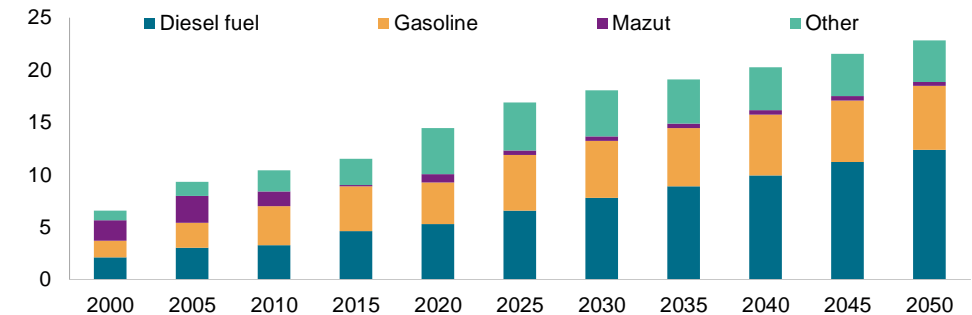


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# Domestic oil prices need to rise to export netback parity levels to ensure adequate crude deliveries to refineries and avoid “grey” product exports

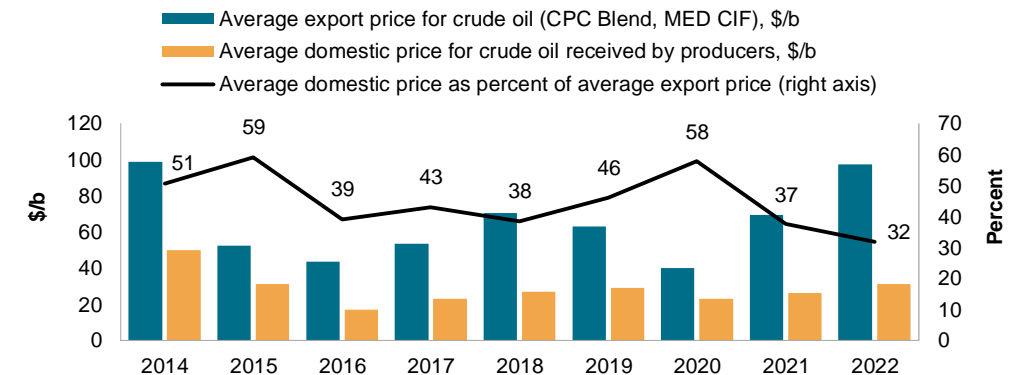
- We expect the transportation segment in particular to be a major incremental consumer of refined products longer term, as diesel-engine vehicles as well as vehicles that run on gasoline (and LPGs) will continue to dominate the fleet.
- Our base case for domestic consumption assumes continued liberalization of domestic oil prices, with the average price levels reaching netback parity by around 2030; this incentivizes crude producers in Kazakhstan to deliver sufficient feedstock supplies to refineries, and refiners have sufficient incentive to direct the bulk of their products to domestic consumers.
  - Cross-border “leakage” of Kazakh products (“grey” exports) is also minimized as Kazakh product prices rise to same level as prices in neighboring countries.
- Two key developments expected during the mid-2020s are likely to compel policymakers to follow through on liberalization of domestic oil prices:
  - **Imperatives of EAEU oil market integration.** The pending launch of the EAEU common market in oil and oil products in 2025 means that it will be difficult for Kazakhstan to continue to resist the pull of market forces, and its domestic prices will eventually be pushed or pulled into parity with its neighbors.
  - **Tightening of Kazakhstan’s crude oil balance as aggregate production declines while domestic demand continues to rise.** The production decline is likely to be initially concentrated in various legacy KMG fields that have traditionally been a mainstay of Kazakh refinery feedstock supply.

Outlook for apparent consumption of refined products in Kazakhstan, MMt



Source: S&P Global Commodity Insights  
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Comparison of domestic Kazakh and international crude oil prices



Source: S&P Global Commodity Insights, KAZENERGY.  
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# Tightness of Kazakh middle distillate supply underscores urgency of domestic price reforms to balance markets and minimize product imports

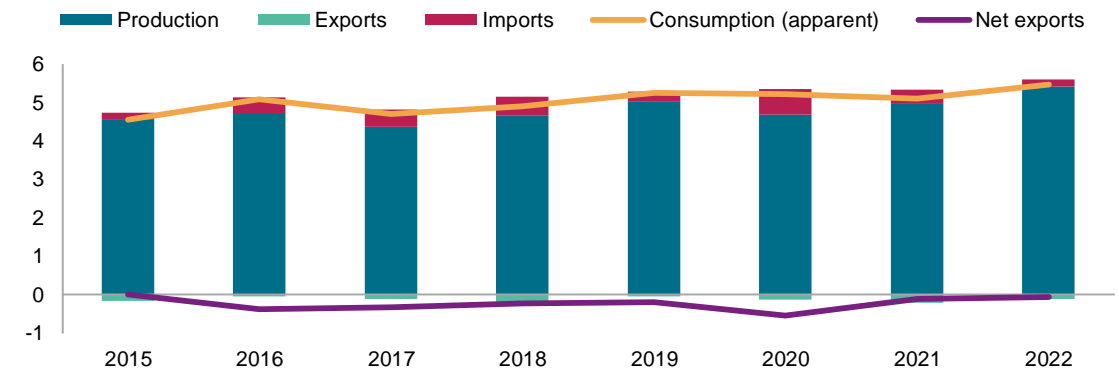
## • Diesel

- Diesel is the single largest component (product) in Kazakhstan's refinery slate and in its domestic consumption balance; widely consumed within Kazakhstan, diesel is used across many economic sectors, while transportation (trucking) is the single largest consumer.
- Kazakhstan remained a (small) net importer of diesel each year during 2016-22.
- In the S&P Global base case, diesel output increases quite strongly during 2023-50, rising by 90% to 10.3 MMt in 2050; but consumption, though, increases by 126% to 12.3 MMt.
- Imports remain necessary during the outlook period, with net diesel imports reaching 2.1 MMt in 2050.
  - Throughput (and therefore diesel production) could be expanded further, but this leads to a problem of disposing of greater volumes of (unwanted) heavy products like mazut.

## • Kerosene

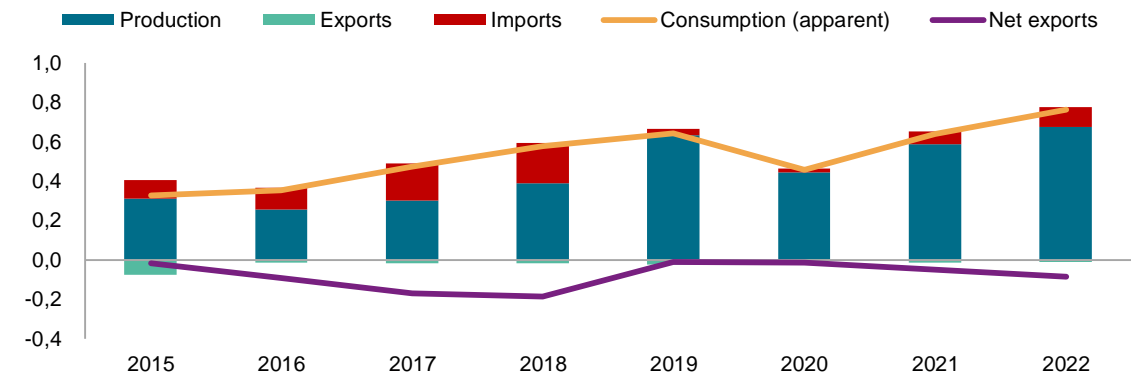
- Jet kero is consumed in the civil and military aviation segments; demand has practically exploded since 2015, growing by an annual average of about 10% during 2016-22.
- Traditionally a net importer of kerosene, Kazakhstan has moved toward self-sufficiency since refinery modernization: domestic production satisfied over 85% of demand in 2022 versus less than 60% in 2016.
- In our base-case outlook, kerosene production grows by 79% over 2023-50 to reach 1.2 MMt/y; domestic supply is expected to meet domestic demand again in the late 2020s, but Kazakhstan will likely shift back to being a slight net importer of kerosene, largely from Russia, in the 2030s.

Kazakhstan's diesel balance, 2015-22, MMt



Source: S&P Global Commodity Insights.  
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Kazakhstan's kerosene balance, 2015-22, MMt



Source: S&P Global Commodity Insights.  
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# Kazakhstan's natural gas industry: A new vision for the sector

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## The new vision:

- The new vision (embodied in Comprehensive Plan for the Development of the Gas Industry for 2022–2026) calls for expanding the role of gas in the economy and changing its underlying economics; in this endeavor, Kazakhstan upgraded the existing gas entity into a national gas champion, creating JSC National Company QazaqGaz; it operates across the entire gas value chain, including exploration, production, transportation, and distribution
  - **Upstream:** Expand the country's existing gas resource base by making investment in upstream gas development attractive (including higher producer prices), and increasing the total amount of (commercial) gas being produced
  - **Midstream:** Expand gas processing to produce more commercial gas; expand the pipeline system to reach more cities and settlements, especially in previously unserved areas, and increasing imports as needed to augment available supply
  - **Downstream:** Expand consumption through further gasification, especially in residential, electric power, and petrochemicals
  - **Pricing:** Generate more value in the sector through higher prices (and pipeline tariffs) to support investment and expansion, and ending QazaqGaz's sizable financial losses incurred in domestic sales; a key measure is introducing differentiated end-consumer prices (e.g., higher prices for export-oriented industry) and higher pipeline tariffs more reflective of costs

# An overview of major accomplishments and challenges in natural gas

## • **Accomplishments:**

- Natural gas production (gross extraction) had been increasing rather robustly, boosted mainly by growth in output at Kashagan, while commercial production (gross output minus reinjection) had also been on rise; because the bulk of Kazakh production is associated gas, output trends were driven mainly by oil developments.
- Since independence, Kazakhstan has succeeded in creating a unified domestic gas transportation and distribution system.
- Further gasification of Kazakhstan is a strategic priority for policymakers; by the end of 2023, 60% of Kazakhstan's population had access to piped natural gas; this exceeded the target set some years ago for 56% by 2030; actual (end-of-pipe) gas consumption doubled over past decade or so, rising from 9 Bcm in 2010 to 19 Bcm in 2023.
- Kazakhstan's gas exports to China grew from less than 1 Bcm in 2015, to reach 7.4 Bcm in 2019-20 before contracting to 5.1 Bcm in 2022; exports to China provide QazaqGaz with an important source of revenue to offset its financial losses on gas sales in the domestic market.

## • **Challenges:**

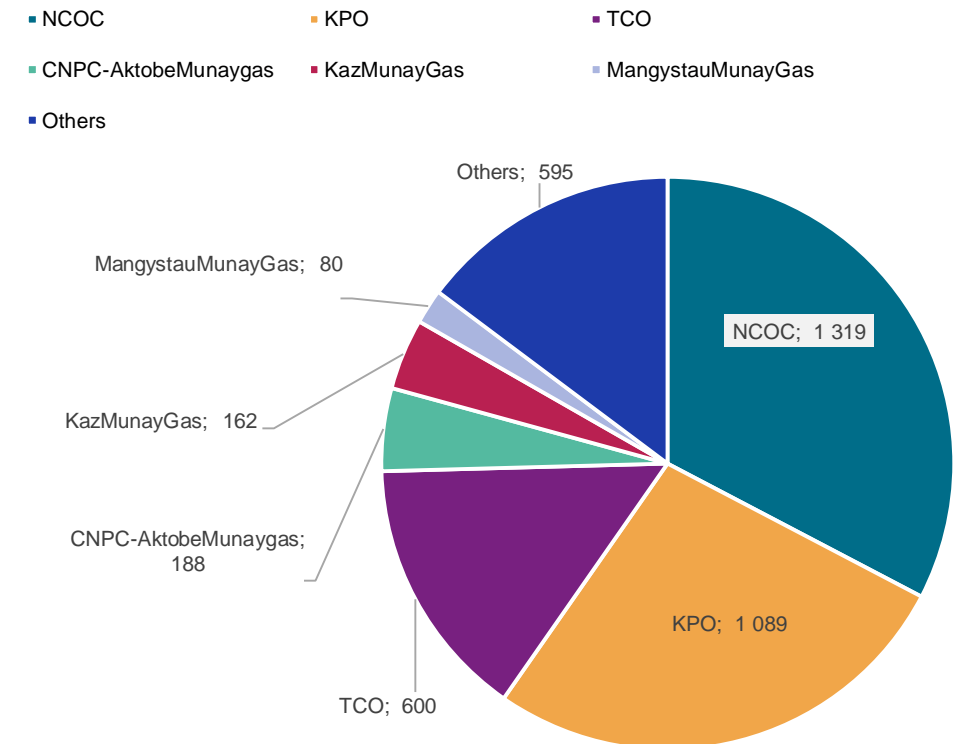
- Low prices for producers of gas combined with low end-user prices threatens Kazakhstan's gasification program, by dis-incentivizing production of commercial gas and also discouraging its efficient use by consumers.
- Exports to China are likely to be undermined longer term by rising domestic needs combined with constrained commercial supply; Kazakhstan will have to make hard choices between exports to the lucrative Chinese market and making more gas available in (mainly unprofitable) domestic markets.



# Kazakhstan's gas paradox: It has ample gas reserves: 3.79 Tcm (putting it among top 20 countries globally) but a limited supply of commercial gas available to consumers

- Domestic reserve definition (categories A+B+C1+C2), distributed over 287 fields
  - S&P Global estimates Kazakhstan's 2P (proven+probable) gas reserves at 138 trillion cubic feet (4.0 Tcm)
  - Concentrated mostly in Precaspian Basin (89%); over half (57%) of reserves are associated gas, much of it found at considerable depths with high sulfur content
  - Karachaganak (KPO), Tengiz (TCO), and Kashagan (NCOC)—the “Big 3”—are the largest gas resource holders
  - Other major resource holders are CNPC-AktobeMunayGas and legacy KMG; QazaqGaz established new E&P subsidiary based on its existing small upstream producer, but has major expansion plans

Kazakhstan's 2P gas reserves in 2023 by operator, Bcm

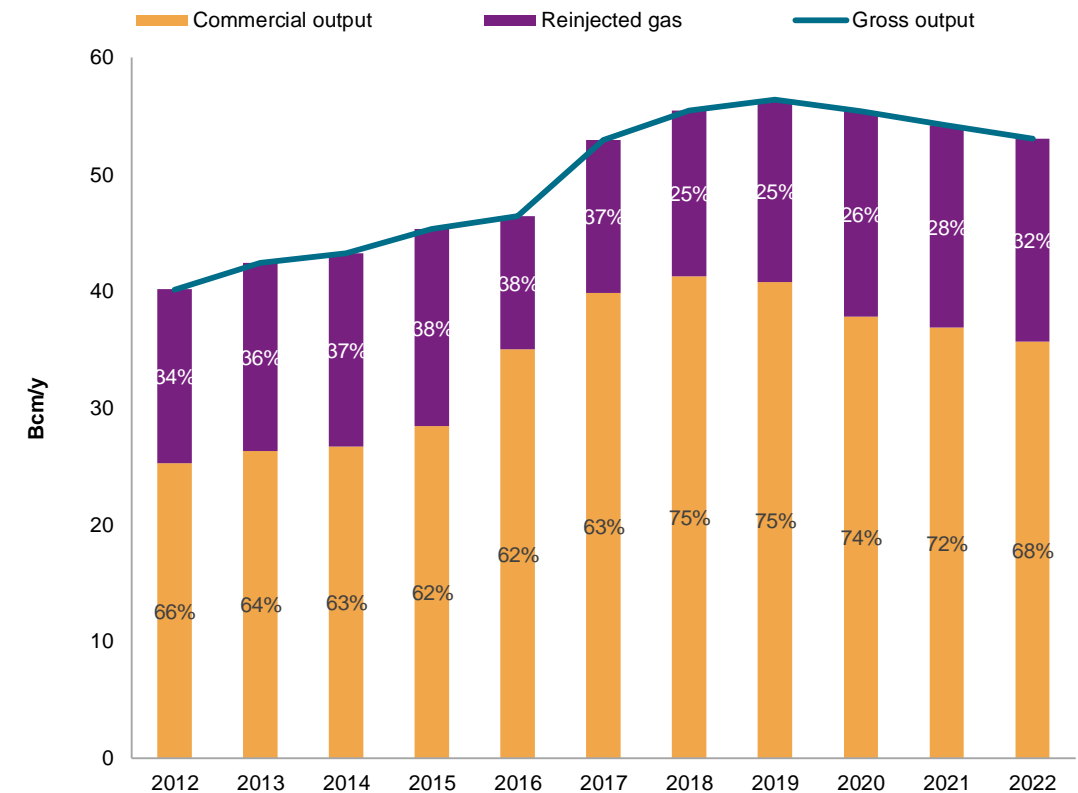


Source: S&P Global Commodity Insights.  
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# Commercial gas availability in Kazakhstan is limited by high reinjection needs for oil production and high cost of processing its high-sulfur raw gas

- Gross gas output declined to 53.2 Bcm in 2022, reflecting the contraction in national oil production last year
  - Commercial output was about 36 Bcm, with about a third of gross production being reinjected to sustain oil production
- Kazakhstan relies mainly on associated gas (61.5% of gross production in 2022) and its subsequent processing (into commercial gas) to supply the bulk of its domestic gas needs
  - Essentially a by-product of oil production, associated gas output cannot be readily scaled to changes in demand; its availability is largely shaped by liquids production decisions

Kazakhstan's gross and commercial natural gas production

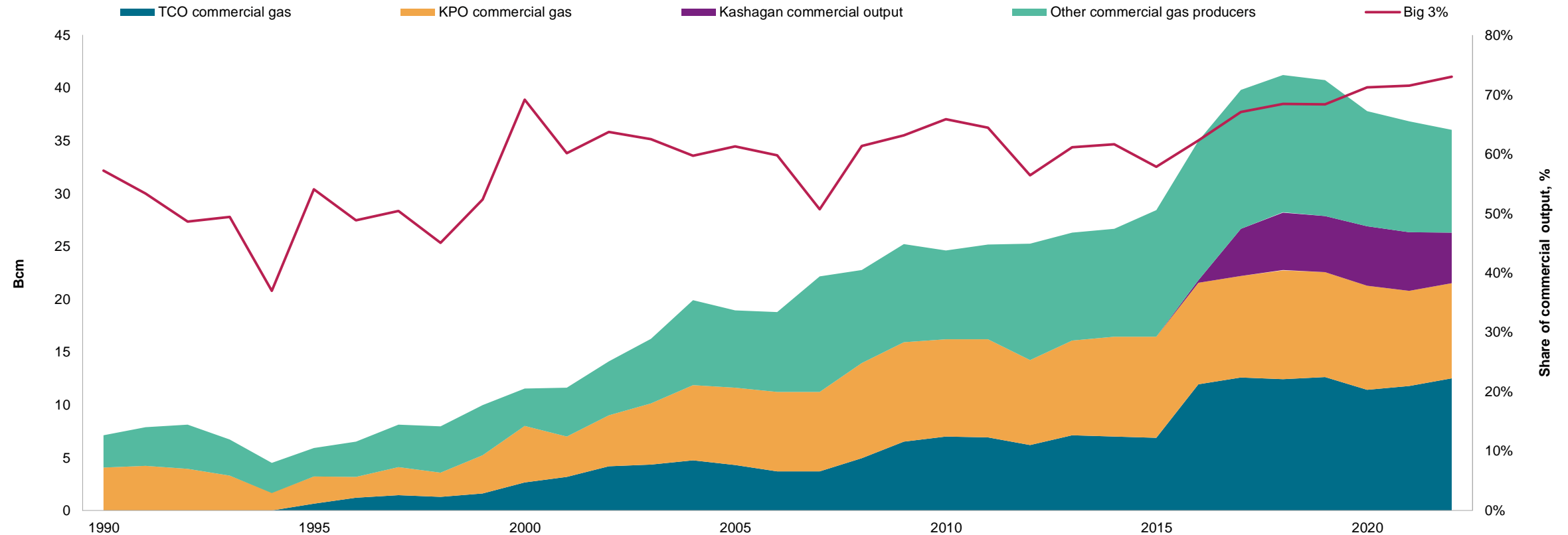


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# “Big Three” accounted for 81.5% of Kazakhstan’s gross gas production in 2022 and 73.1% of commercial gas production

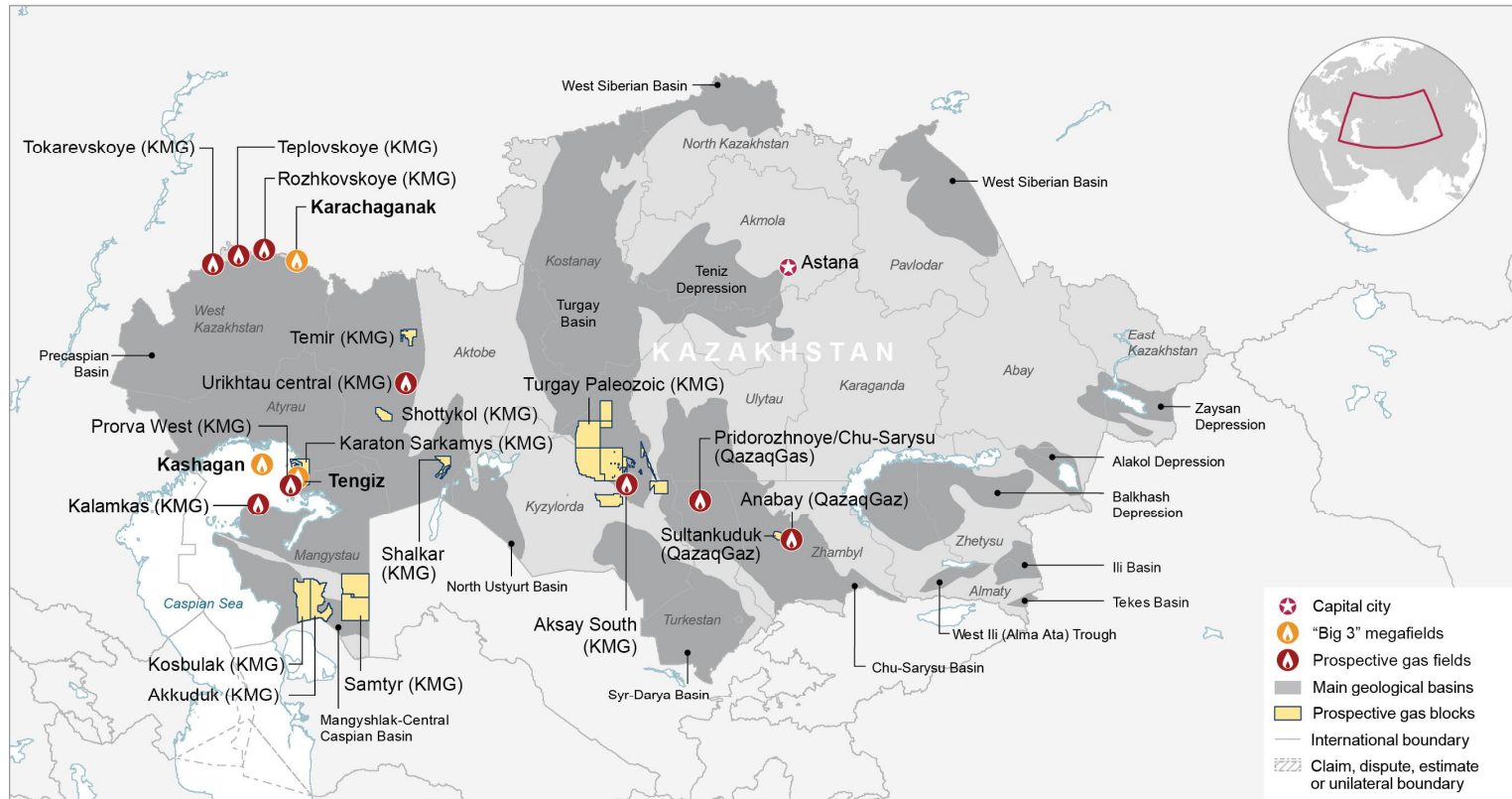
“Big Three” share in commercial gas production in Kazakhstan



Source: S&P Global Commodity Insights.  
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# Kazakhstan hopes to increase commercial gas supply by stimulating more upstream exploration and development

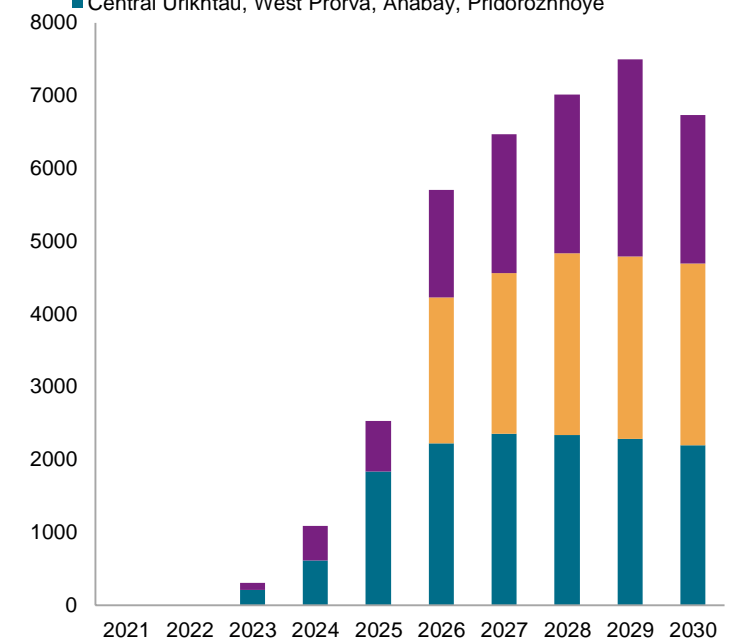
## Kazakhstan's new sources of gas: Planned upstream development by KMG and QazaqGaz



Data compiled May 31, 2023.  
 Source: S&P Global Commodity Insights upstream E&P/basins content (EDIN): 2009728.  
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## New planned projects to increase gas production by 2030, MMcm/y

- Teplovsko-Tokarevskaya group of fields (8); Ansagan (Almex+), Rozhkovskoye
- Additional 2.5 Bcm of processing KPO gas
- Central Urikhtau, West Prorva, Anabay, Pridorozhnoye



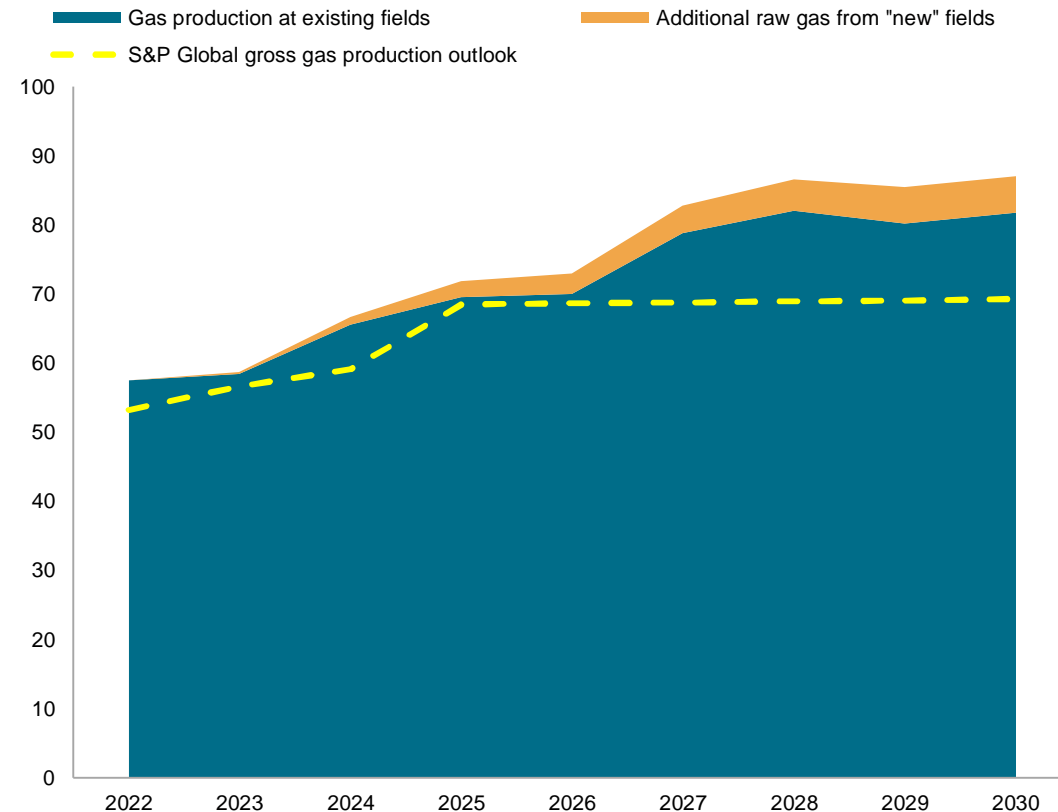
Source: Kazakhstan's Complex plan for gas sector development to 2026, S&P Global Commodity Insights.  
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**Both new upstream development and expansion of high-sulfur gas processing (at KPO and Kashagan) are expected to add to incremental commercial gas supply. But such incremental volumes are quite expensive.**

# Official outlook for Kazakhstan's gas balance

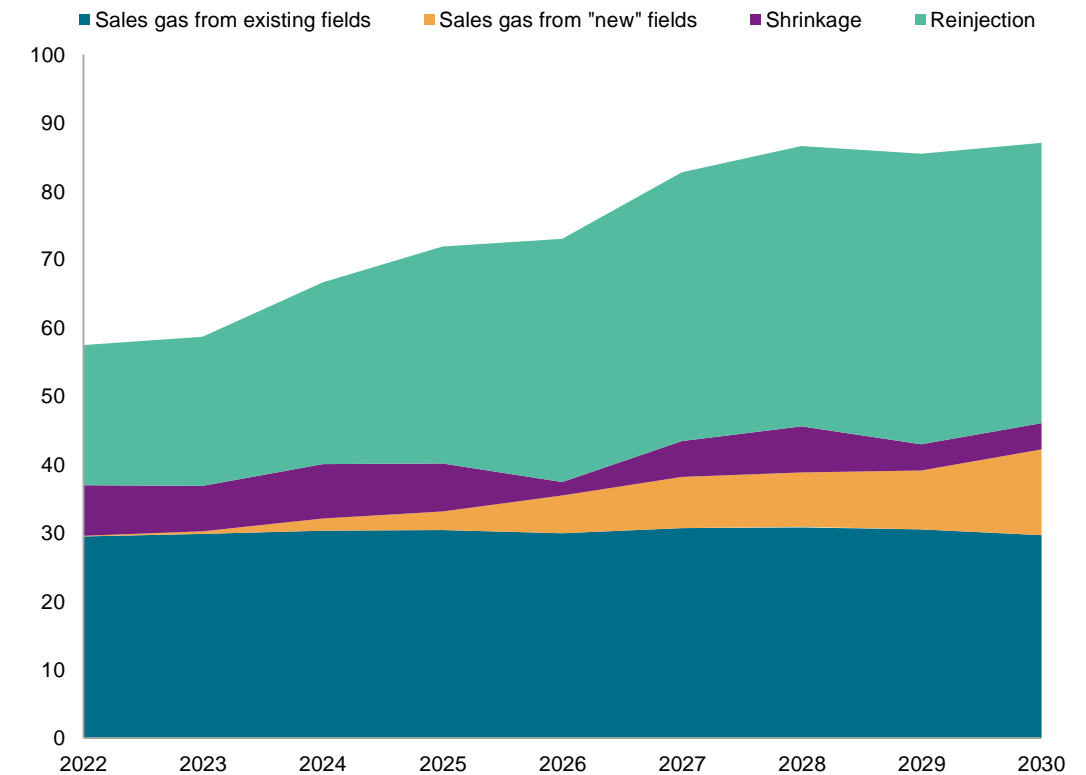
Optimistically, Kazakhstan is counting on significant new field production to close the gap with rising gas consumption (driven by the ongoing gasification program)

Kazakhstan's official raw gas production outlook to 2030, Bcm



Source: Kazakhstan's Comprehensive Plan for the Development of the Gas Industry for 2022-2026  
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Gas production outlook according to Kazakhstan's official gas development plan, Bcm



Source: Kazakhstan's Comprehensive Plan for the Development of the Gas Industry for 2022-2026.  
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**QazaqGaz and KMG plan to bring on stream a number of new gas fields over the next 5-7 years; these include Urikhtau, Prorva West, Pridorozhnoye, Anabay, Barkhanna-Sultankuduk, Rozhkovskoye, Ansagan, and Teplovsko-Tokarevskoye; these new upstream projects are expected to provide incremental gas production of up to 4.2 Bcm/y by 2030.**

# A challenge for Kazakhstan's commercial gas supply is gas processing

Kazakhstan's gas processing plants		
Gas processing plant	Capacity, Bcm/y	Utilization, %
Tengiz GPZ	13.0	100
Zhanazhol GPZ	8.4	62
Bolashak GPZ (NCOC)	6.3	84
Chinarevskaya GTU	4.2	16
KazGPZ	1.5	60
Shagyrlı GTU	1.3	73
Kashagan GPZ* (QazaqGaz)	1.15	
Zhanaozen GPZ*	0.9	
Amangeldy GPZ	0.7	49
Akshabulak GTU	0.55	67
Targabatay GPC	0.55	52
Kozhasay GPC	0.43	100
Alibekmola GTU	0.43	100
Borankol GTU GPZ	0.36	10
Severny Nurzhanov GPZ	0.15	100
Karakuduk GPZ	0.13	26
Arystanovskoe GTU	0.12	44
Vostochny Makat GPZ	0.04	100
EmirOil	0.04	87
Balginbayev S. GPZ	0.02	100
Kulzhan GTU	.01	28

Note: \*Planned GPZ

Source: S&P Global Commodity Insights, formerly IHS Markit; QazaqGaz

- Total capacity of Kazakhstan's gas processing plants at year-end 2022 is 38.8 Bcm/y; utilization is 74%
- Kazakhstan has five major gas processing plants (GPZs), several smaller plants, and also an important arrangement for the processing of Karachaganak's raw (sour) gas across the border at Russia's Orenburg gas processing plant
- The five major plants are Tengiz (13 Bcm/y, TCO), Zhanazhol GPZ (8.4 Bcm/y, CNPC-AktobeMunayGaz), Bolashak (6.3 Bcm, NCOC), Chinarevskaya GTU (4.2 Bcm, Zhaikmunay), and KMG subsidiary KazGPZ (1.5 Bcm/y, OMG)
  - Only TCO and Bolashak plants have more complex technology capable of processing sour associated gas; other plants are generally smaller and technologically simpler

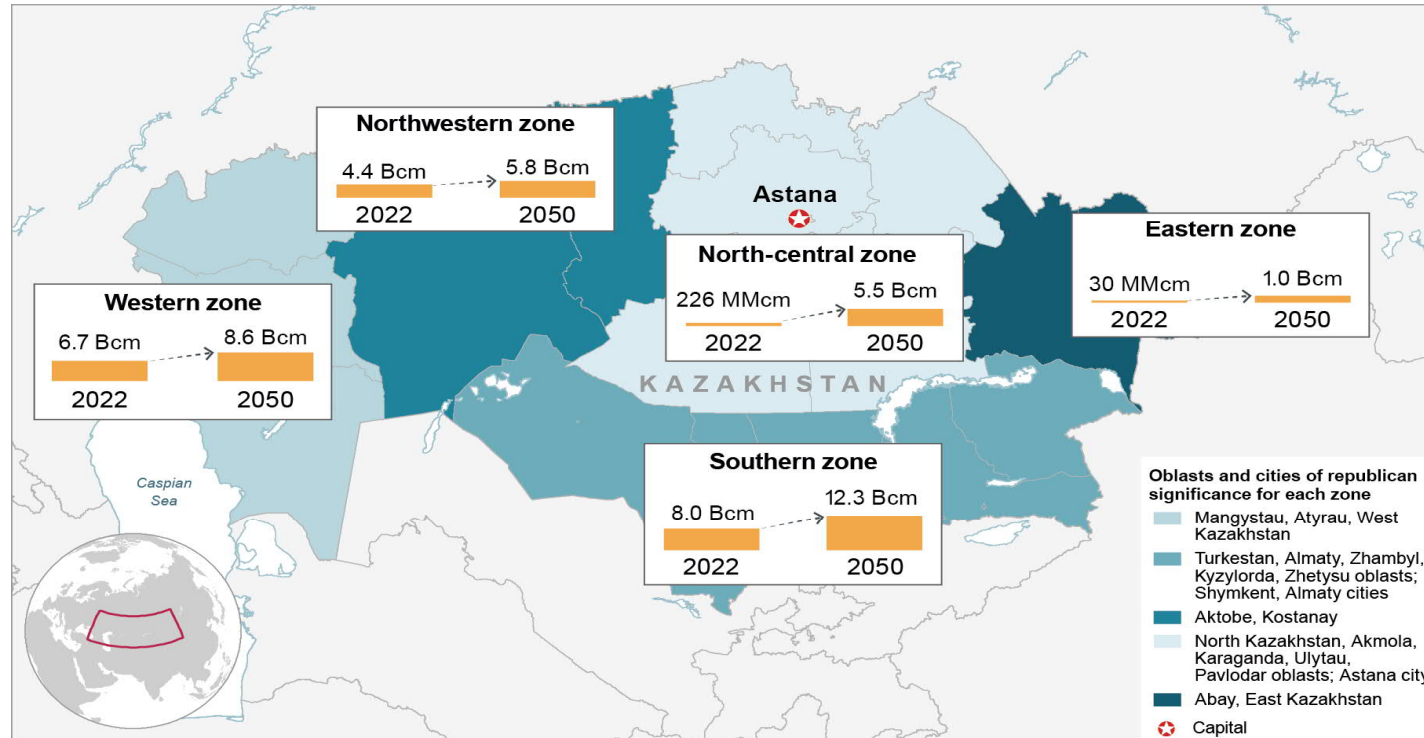
# Expansion plans for gas processing in Kazakhstan

- **Orenburg GPZ:** Nearly all of Karachaganak's raw (high-sulfur) gas output that is not reinjected (9 Bcm in 2021) is sent across the border to Russia for processing at Gazprom's Orenburg gas processing plant under a long-term agreement; Part of the commercial gas from Orenburg GPZ is sent back to Kazakhstan (to QazaqGaz through KazRosGas), and the rest is sold under export contracts through Gazprom's subsidiaries
  - Currently, Orenburg GPZ is facing technical issues related to the acceptance of additional volumes of high-sulfur Karachaganak gas; although the relationship with OGPZ will continue into the future, KPO is considering alternative options for processing its gas, including building a new on-site GPZ to strip out sulfur
  - Kazakhstan's Ministry of Energy is also considering whether Karachaganak gas could be processed at Zhaikmunay's new and expanded Chinarevskaya GTU, with potential output of 4 Bcm/y of commercial gas; however, Chinarevskaya GTU is not equipped to process high-sulfur raw gas, so technological upgrading would be required (estimated capex for upgrade of \$3 billion)
- **Kashagan GPZ:** A new 1 Bcm/y raw gas processing plant at the Kashagan field is under construction by a QazaqGaz subsidiary; dry gas output expected at 0.75 Bcm/y; capex is \$860 million with a planned launch in 2025
  - More gas processing could be built in the future as part of the implementation of Phase 2 of Kashagan development
    - Phase 2 consists of two separate projects (Phase 2A and Phase 2B) that together would increase oil production to about 700,000 b/d (33 MMt/y) over a 10-year period
    - Phase 2A (currently under review) would increase total liquids output to 500,000 b/d (23.7 MMt/y) with an additional 4 Bcm/y of raw gas supplied to a new gas processing plant; an FID is expected in 2023, with project start-up in 2026 (capex \$1.6-\$1.8 billion); **GPZ start-up planned for 2028**
    - Phase 2B could bring NCOC's total liquids production to 700,000 b/d; **up to** an additional 6 Bcm/y of raw gas could be made available, either for a new on-site processing plant or perhaps to back-fill TCO's existing facilities; an FID is expected in 2024, with project start-up in 2030 (capex \$3-\$3.5 billion)
- **Zhanaozen GPZ:** **KMG plans to build** a new Zhanaozen GPZ that should replace the existing and quite dilapidated KazGPZ; the date for scheduled completion was recently pushed back to 2026
  - The plant's capacity is planned to be 0.9 Bcm/y of raw gas, yielding 759 MMcm/y commercial gas, 232,000 tons of LPGs, and 82,000 tons of pentane-hexane fraction



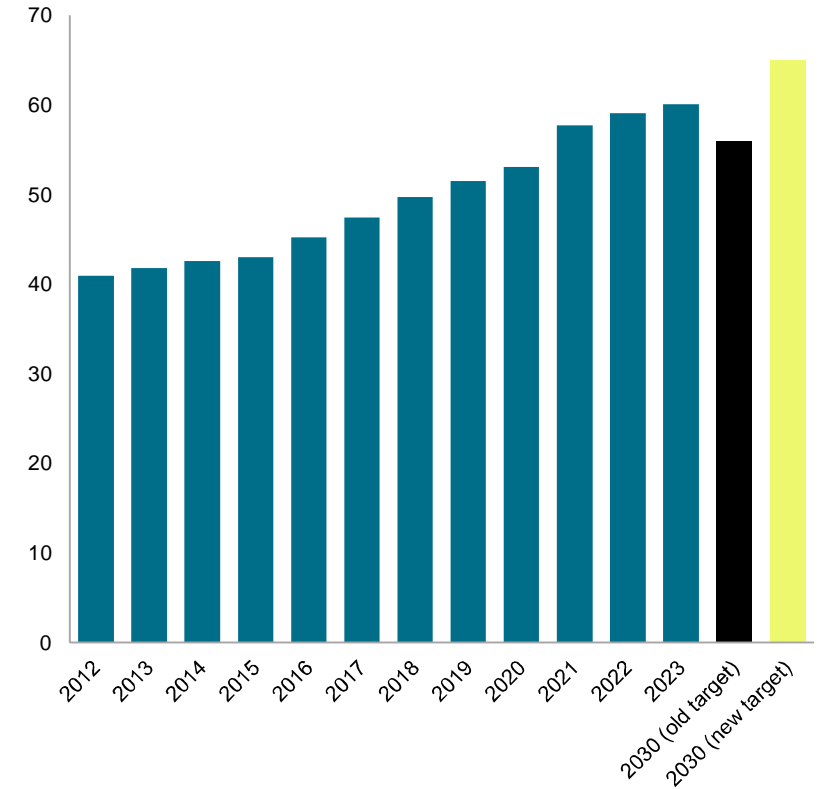
# Gasification remains a major goal for Kazakhstan's gas sector, especially to make gas available to residents in regions previously lacking piped gas

**Kazakhstan's domestic gas consumption (end of pipe) in 2022 and outlook to 2050 by consumption zone**



Data compiled Sept. 7, 2023.  
 Source: S&P Global Commodity Insights: 2010716.  
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**Kazakhstan's gasification levels and 2030 targets, %**



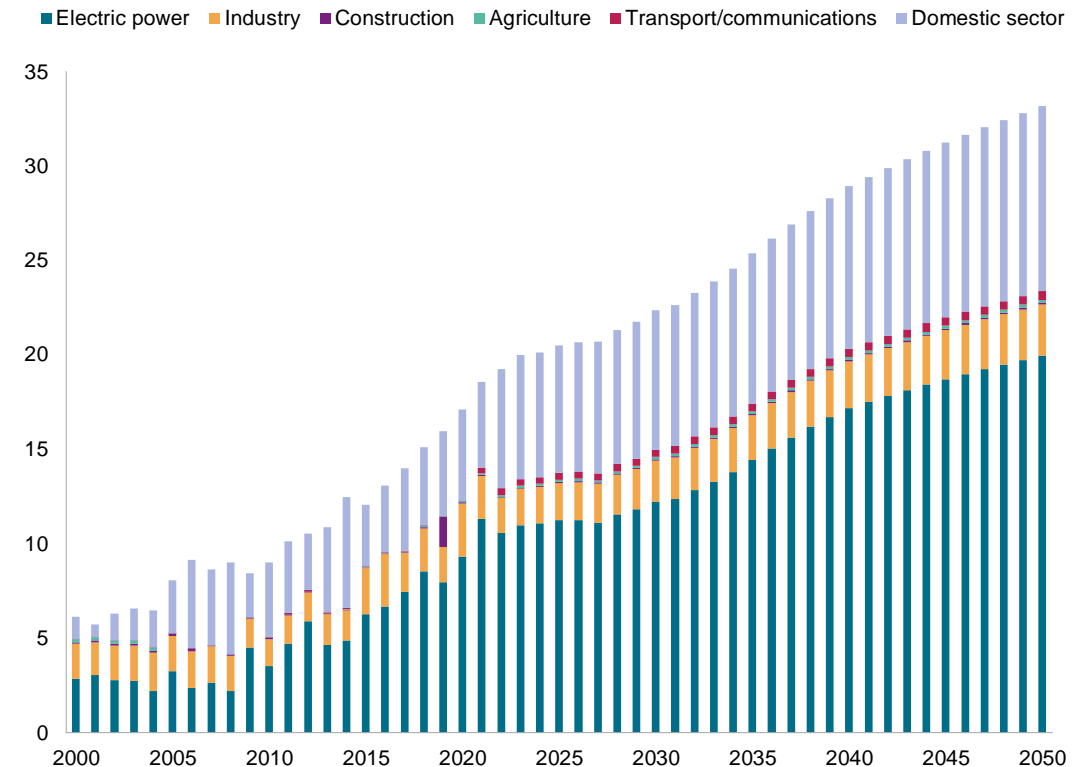
Source: S&P Global Commodity Insights.  
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**By the end of 2023, 60% of Kazakhstan's population had access to piped natural gas; this exceeded the target set some years ago for 56% by 2030; the new target set for 2030 is 65%. Prior to completion of Phase 1 of the SaryArka pipeline, only 10 out of Kazakhstan's 14 oblasts and two of three republic-level cities had access to piped gas; by 2030, to goal is for at least some areas of all oblasts to have access to piped gas.**

# Our base-case consumption outlook: Slowing growth in medium term, but end-of-pipe gas consumption expected to grow substantially by 2050, with consumption by electric power more than doubling

- After experiencing robust growth since 2015 (marking launch of gasification program), end-of-pipe consumption in 2022 reached 19.2 Bcm; total apparent consumption was 30.4 Bcm
  - Main end-of-pipe consumers are electric power (55% of total) and residential-commercial (33%), with residential alone being 5.2 Bcm
  - Industrial end-of-pipe was 1.9 Bcm, but oil and gas sector (at top-of-pipe) was another 1.8 Bcm
- End-of-pipe gas consumption is expected to be 20.5 Bcm/y by 2025 (so a much slower pace of expansion is envisioned in medium term than in recent years), reaching about 33.2 Bcm/y by 2050
  - The slower pace in the medium term reflects a series of constraints: commercial gas supply, pipeline developments, and lags in projects by consumers (especially in power)
  - Gas (methane) consumption in petrochemicals is not expected to be a major growth driver
  - The main consumption drivers are power generation and residential-commercial (domestic sector)
  - Consumption of natural gas (CNG, LNG) as a transport fuel in vehicles seems also likely to grow, but only at a fairly modest pace

Kazakhstan's natural gas consumption outlook by sector to 2050, Bcm



Notes: End-of-pipe consumption; transport excludes pipelines; domestic sector is residential-commercial-municipal.

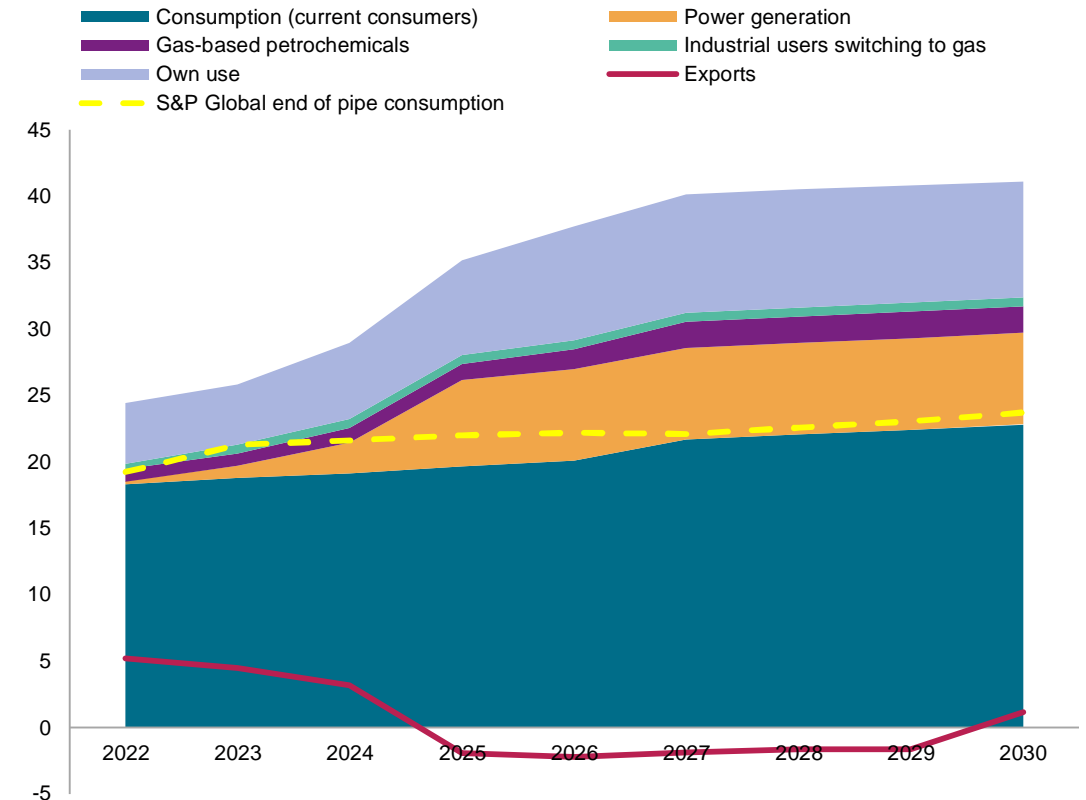
Source: S&P Global, Kazakhstan's Statistical Agency

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Kazakhstan's official gas demand outlook envisions a more rapid expansion of consumption in the medium term, with sizable increases by petchems (although expectations have been scaled back), as well as gas-fired power plants and new large industrial consumers

- Earlier (2018-19) Ministry forecasts envisioned major new gas demand for petchem projects emerging, expecting an additional 6 Bcm/y of demand by 2027
  - However, by 2020, expectations shifted to not just petchem projects driving growth but also more consumption in power generation and by large industrial consumers
- In 2021, the Energy Ministry indicated that gas demand for petchems is likely to be lower, around 3.5 Bcm/y in 2030, while new power sector projects will consume ~5.7 Bcm/y and large industrial enterprises will consume ~0.7 Bcm/y
- Current (2022) QazaqGaz projections expect only 1.7 Bcm/y by 2030 in petchem demand, 5.3 Bcm/y from the power sector, and ~4 Bcm/y from large industrial consumers
  - But this still drives exports out of the balance by mid-2020s
- Our view is that NGL-based petchems are a better fit for Kazakhstan's resource endowment than methane-based petchem expansion (e.g. methanol, ammonia, nitrogenous fertilizers)

Kazakhstan's official gas consumption outlook, Bcm



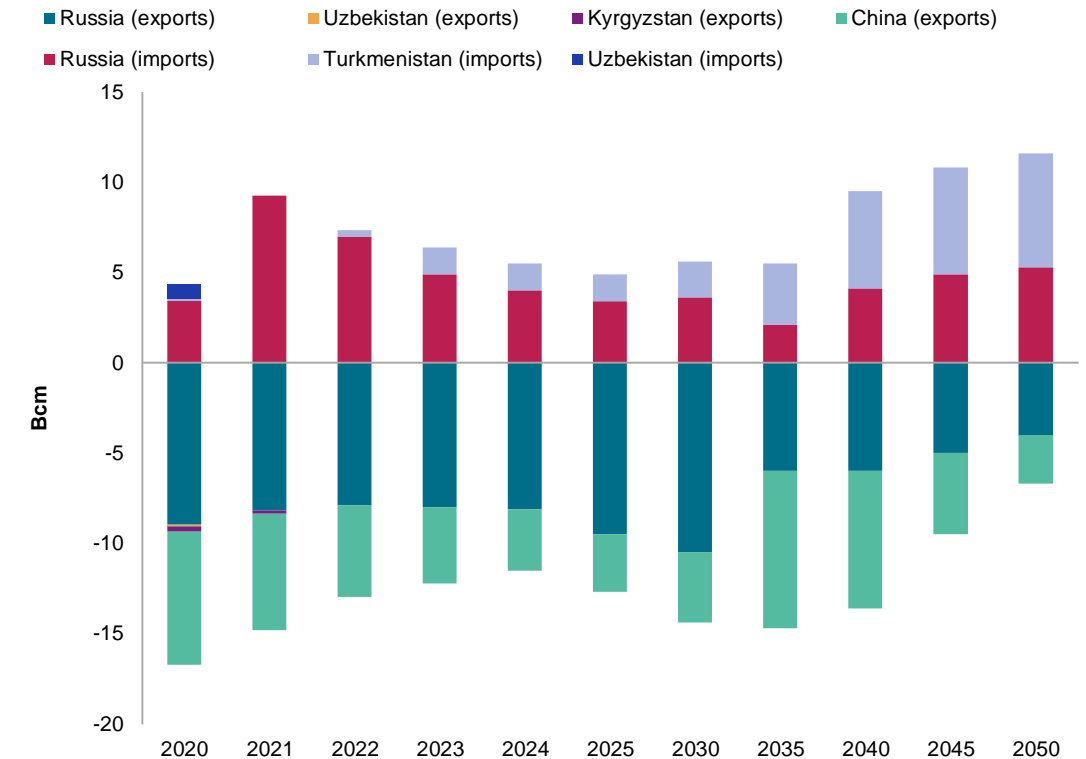
Source: S&P Global Commodity Insights.

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In our base case, Kazakhstan shifts to become a net gas importer, but later in 2040s (importing more gas from Turkmenistan and Russia), reflecting constraints in commercial production and growing domestic demand that curb exports

- Constrained commercial supply means Kazakhstan must sacrifice high-value exports to make more gas available for domestic use
  - Exports (especially to China) represent an extremely important source of revenue for QazaqGaz, helping to offset financial losses incurred on domestic sales
    - Contracted exports to China are for 10 Bcm/y during 2019-23; QazaqGaz is currently negotiating a new contract with CNPC
    - Kazakhstan's gas exports to China grew from less than 1 Bcm in 2015 to reach 7.4 Bcm in 2019-20, but have since contracted to 5.1 Bcm in 2022
    - Exports to Russia – reflecting mainly deliveries of raw gas from Karachanak to Orenburg – will remain sizable even if KPO builds its own on-site gas processing plant
- Imports are going to be increasingly relied on to meet demand in northern and southern Kazakhstan
  - Imports from Russia are expected to remain at about 4-5 Bcm/y in 2040s
  - Turkmen imports are expected to amount to 5-6 Bcm/y in 2040s

Kazakhstan's natural gas exports and imports by destination: S&P Global base-case outlook to 2050



Source: S&P Global Commodity Insights.

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# Several new pipelines are contemplated to bring in more Russian gas to gasify northern Kazakhstan

## Kazakhstan's gas sector (selected key elements)



Data compiled June 1, 2023.

Source: S&P Global Commodity Insights upstream E&P/midstream content (EDIN): 2009795

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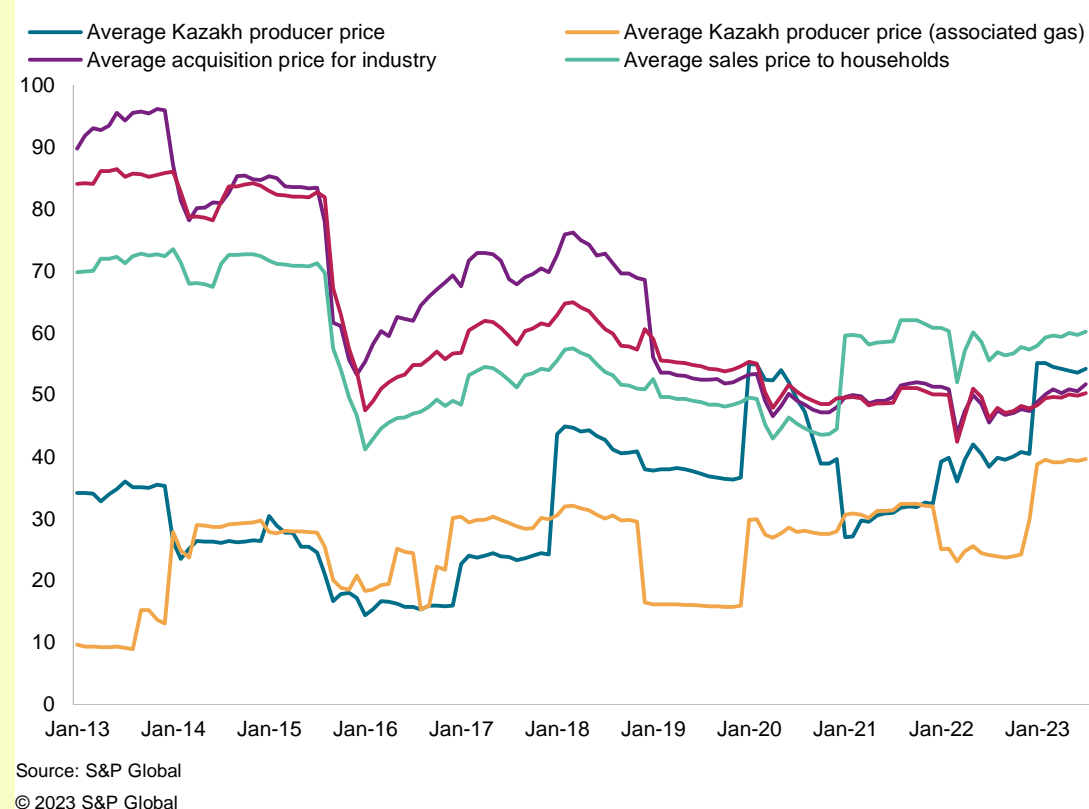
## Various routes under consideration:

- Omsk-Pavlodar-Semey
- Barnaul-Rubstovsk-Semey
  - With extension to Alashankou for exports of Russian gas to China
- Ishim-Petropavlovsk
  - Connecting with SaryArka pipeline extension from Astana and Kokshetau
- Tobol-Kostanay-Astana
  - Or connecting with SaryArka extension from Astana to Kostanay



Regulated end-user prices are inadequate to support QazaqGaz investment needs and national gasification goals; producer prices are too low to encourage producers to expand output;  
**Key part of new vision for sector is much higher prices throughout value chain:**

Historical average prices for natural gas in Kazakhstan, \$/Mcm



- End-user prices were increased by 8% in August 2023 with greater differentiation
  - New consumer categories were created
  - Plans to introduce differentiated pricing by volume delivered
  - Plans for higher prices for incremental consumption
- Wholesale ceiling prices rose by 10% in July 2023
  - Possibility of an annual increase of 20-75% through 2028, moving gas prices to “economic levels”
- Producers have possibility of higher prices for “new” gas
  - Even blended prices for gas weighted between domestic and export prices

**KREM regulates end-user gas prices by region and customer type (residential versus industrial). Its approach is guided not strictly by energy policy per se, but broader macroeconomic considerations (inflation targeting)**

**Producer prices—the prices upstream producers receive—are not administratively regulated but are individually negotiated between producers and QazaqGaz; in reality, QazaqGaz wields significant power in these negotiations, and because low regulated end-user prices, producers often end up selling gas at a price that barely covers costs or forces them to sell at a loss.**

# Vision for EAEU single gas market outlined in several key principles

EAEU Treaty's (2014) Appendix No. 22 established key principles for the single gas market formation and design:

**Elimination of export duties in mutual gas trade**

**Priority of meeting domestic consumption needs over exports outside the Union**

**Transportation tariffs to be set in accordance with individual-country legislation**

**Unification of technical standards for natural gas**

**Ensure environmental protection and security**

**Sharing of data on gas consumption**

Appendix No. 22 sets preconditions for establishing access to the gas transportation systems of the member countries:

- Access is to be provided under the same conditions for all shippers, meaning that companies from one EAEU country have the right to access pipeline infrastructure in another EAEU country on the same terms as gas producers in the host country (that are not owners of the pipeline infrastructure)
- However, the member-states have not reached an agreement on equal transit access to gas pipeline infrastructure by shippers in member countries for export to third-country markets, nor has the issue of transportation tariffs been fully resolved



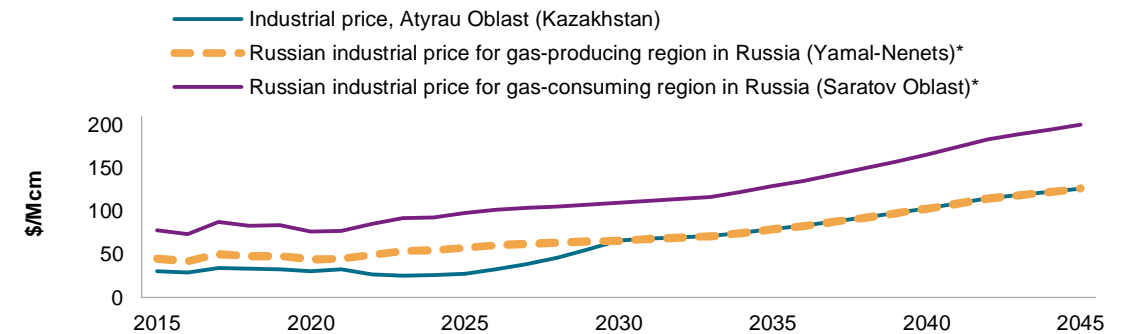
# Domestic gas prices for consumers in Kazakhstan's gas-producing area are expected to gradually harmonize with consumer prices in Russia's gas-producing regions

Among non-Russian EAEU member states, Kazakhstan faces the greatest challenges in reaching domestic price parity, for two important reasons:

- As a hydrocarbon exporter, Kazakhstan's economy competes with, rather than complements, Russia's:
  - Lack of strong complementarity between Kazakh and Russian economies remains a challenge to EAEU integration; both countries are major hydrocarbon producers and exporters, depending primarily on energy exports to global markets rather than intra-EAEU exports
  - In contrast, the trade structure of the other EAEU members—Armenia, Belarus, and Kyrgyzstan—is oriented more strongly toward the economic space of Russia, facilitating EAEU market integration, as they already operate largely according to Russia's general acquis, importing most of their gas needs from Gazprom (and Gazprom also owns their natural gas infrastructure)

- Kazakhstan's end-user gas prices are among the lowest among EAEU members, and therefore have “the farthest to go” in terms of price harmonization (industrial gas prices would need to increase by almost 20% per year on average between 2025-30 to reach parity with Russia's gas-producing regions). End-user gas prices in Kazakhstan remain heavily administered, and the social goal of supplying low-cost fuel to industrial and retail customers in the domestic market has been applied for some time:
  - This practice greatly disincentivizes supply by Kazakh commercial gas producers (who subsidize artificially low consumer prices through gas sales at producer prices well below market levels); even so, domestic sales are a financial loss-making operation for middleman QazaqGaz (financial losses in deliveries to the domestic market are offset by export and transit revenues)
- When the EAEU was first proposed, the idea was that gas trading across borders would be done through exchanges; but a dual approach has emerged for existing bilateral trade relations to continue, augmented with exchange trading; Russia has sought to preserve much of the status quo of its existing trade, ostensibly to protect against the type of price fluctuations seen in global gas markets recently

## Price Outlook for Natural Gas Consumed by Industry in Western Kazakhstan (Atyrau Oblast): Harmonized with Russia's Yamal-Nenets Okrug



Notes: Prices include VAT. Assumes Atyrau prices close price gap with Yamal-Nenets in 2025-30.

Source: S&P Global Commodity Insights.

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# Kazakhstan's LPGs: Growing pressure on available supply from rapidly rising demand for autogas and petrochemicals

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## **Accomplishments:**

- Kazakhstan is a sizable producer and a net exporter of LPGs; major producers are gas processing plants, led by TCO
- But domestic consumption has been rising rapidly in recent years, mainly driven by use as autogas (in motor vehicles)
- But the major growth driver is going to shift to petrochemicals with launch of new major plants, starting with polypropylene in 2022

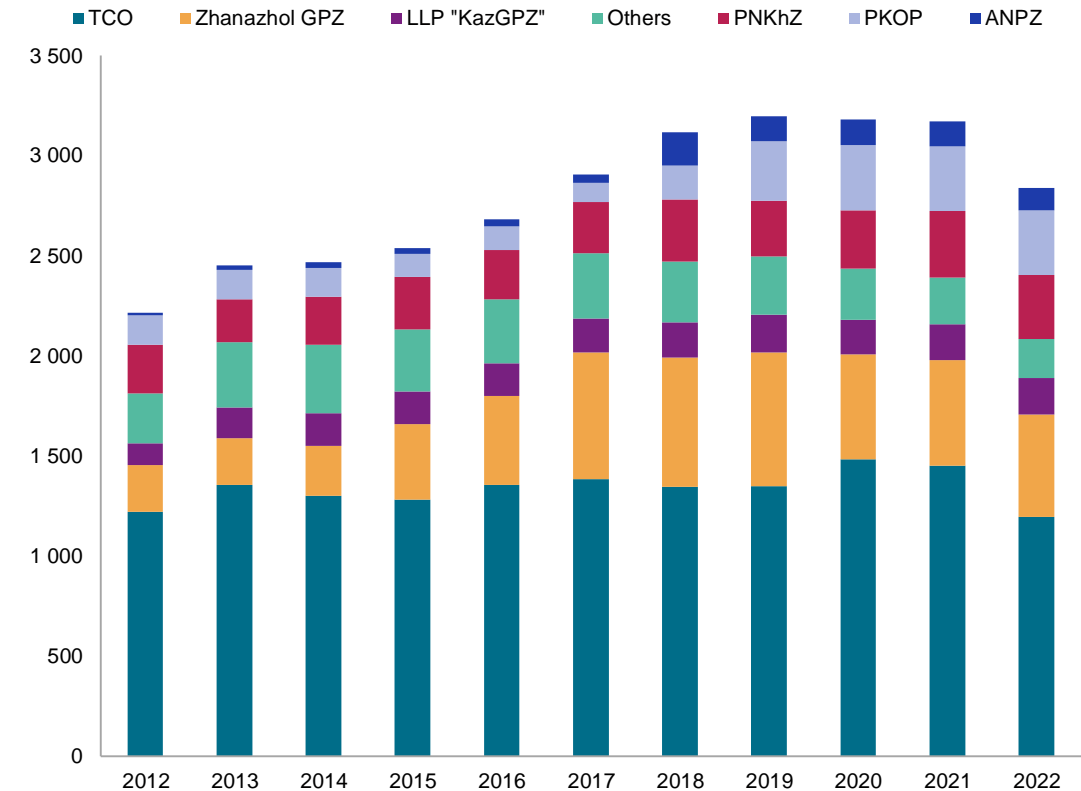
## **Challenges:**

- The combination of low prices for gas producers-processors and low end-user prices dis-incentivizes LPG production while encouraging inefficient use by consumers
- Ongoing de-regulation of LPG pricing through increased electronic trading was put on pause following the events of January 2021, with a return to more direct price regulation

# Kazakhstan is a sizable producer and exporter of LPGs

- Kazakhstan produced ~3.2 MMt/y of LPGs in 2019–21, although output fell by 12.5% to 2.8 MMt in 2022 as a result of lower associated gas output
- Kazakhstan's main producers are gas processing plants, led by TCO; GPZs accounted for 73% of LPG output in 2022
  - TCO is the largest producer, accounting for 43% of output in 2022
- Oil refineries accounted for 27% of LPG production in 2022
  - Their output (and their share of the national total) increased considerably after the refinery modernization program was completed in 2018

LPG production in Kazakhstan by producer, thousand tons

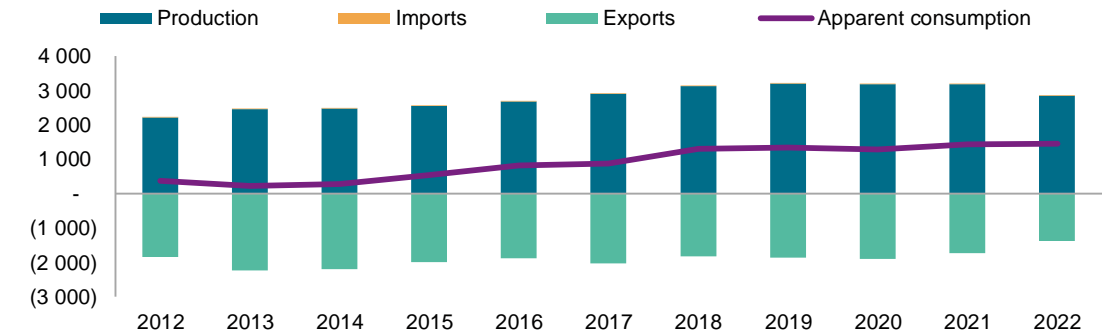


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# Kazakhstan is a sizable net exporter of LPGs

- In 2022, Kazakhstan consumed only about two-thirds (1.8 MMt) of the LPGs it produced (2.8 MMt)
  - Imports remain virtually negligible
- Strong growth in domestic demand has occurred across Kazakhstan since 2015, with LPG consumption increasing on average by 16% annually through 2021; in 2022, LPG consumption jumped by 21%, driven mainly by higher demand in (vehicle) transportation; strong growth has continued into 2023
  - A key factor has been the low retail price of LPG and its sizable price differential with motor gasoline
- This dynamic has squeezed exports considerably: they dropped from over 2 MMt/y in 2018-20 down to 1.4 MMt in 2022
- Automobile transport is the largest consumption segment (36% of demand in 2022), followed by residential (home heating and cooking) at 21%, the oil and gas sector itself (16%), and then other industry (10%)
  - Petrochemical consumption was negligible through 2022, but this is set to grow rapidly in the next few years with the launch of several major plants

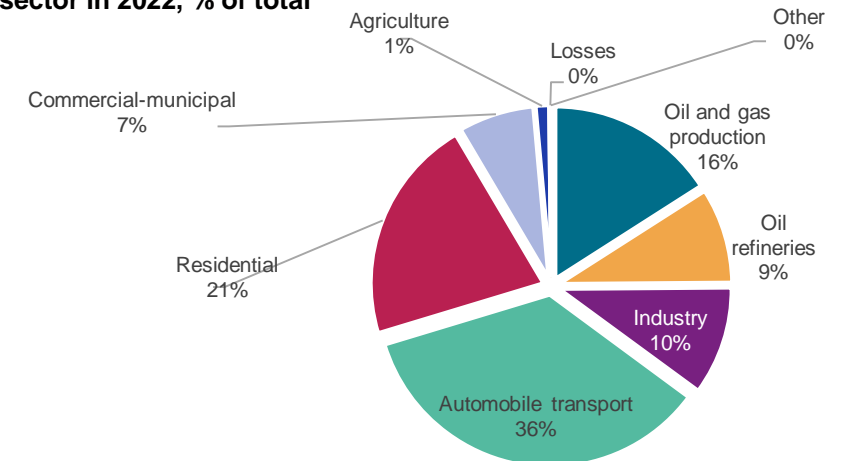
Kazakhstan's LPG balance, thousand tons



Source: S&P Global Commodity Insights.

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LPG consumption by sector in 2022, % of total



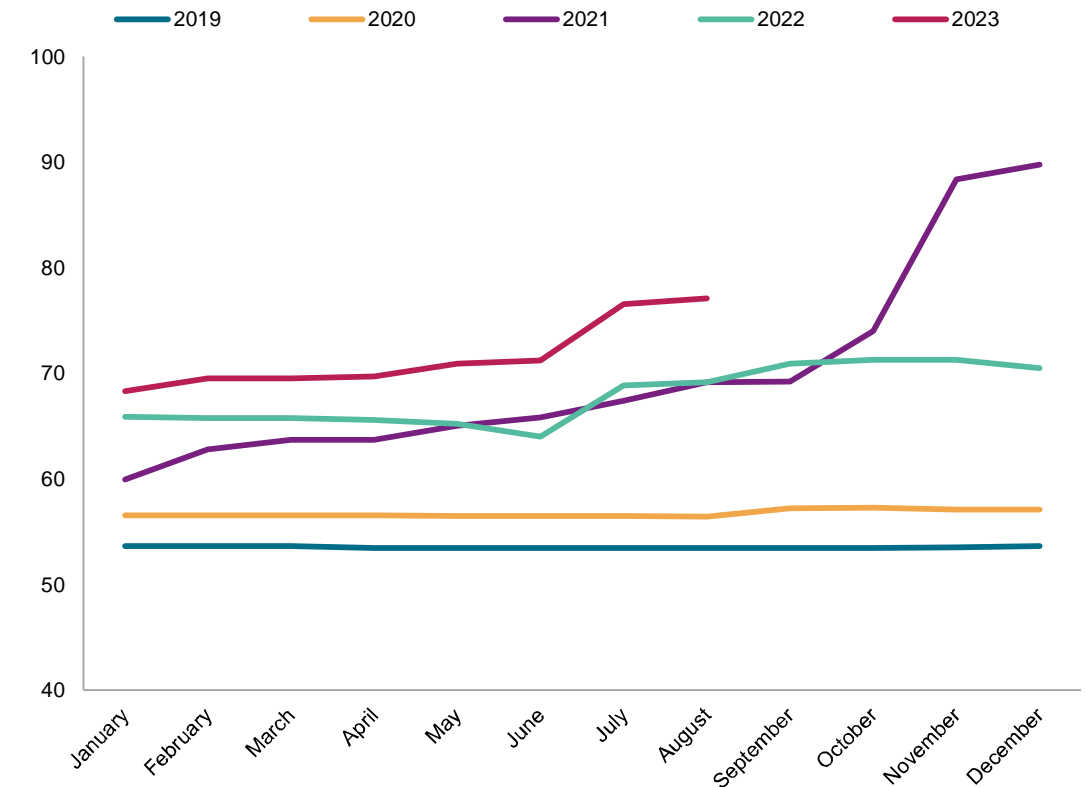
Source: S&P Global Commodity Insights, Kazakhstan's Bureau of National Statistics

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# Ongoing de-regulation of LPG pricing was put on hold after the January 2022 events, following a rapid run-up in prices in 2021

- Since 2019, Kazakhstan's domestic LPG market has been in a transition from highly regulated to semi-liberalized (although the pace has varied over time); this liberalization drive aims at four key objectives:
  - Raising wholesale producer prices to incentivize plant modernization and output expansion
  - Reducing the share of the overall value chain captured by intermediaries (distributors)
  - Strengthening competition in the domestic LPG market
  - Increasing transparency of deliveries to the market
- LPG electronic trading commenced in 2019, so that by the end of 2021, about 70% of LPGs consumed were being purchased through exchanges and this was nearly 100% in early 2022
  - Prices increased rapidly in 2021 (the average retail price paid by consumers for LPG nearly doubled, rising from 60.1 tenge/liter in December 2020 to 111.8 tenge/liter in December 2021), triggering an outbreak of popular unrest in January 2022
  - However, Kazakh domestic prices still remained relatively low compared to other countries: in November 2021, the average retail LPG price in Kazakhstan was still only about \$0.21/liter compared with \$0.85/liter in the European Union, and \$0.42/liter in Russia
- In response to the January 2022 unrest, the government stepped back in to directly regulate the domestic LPG market.

Average LPG retail prices in Kazakhstan by month, 2019-23, tenge per liter

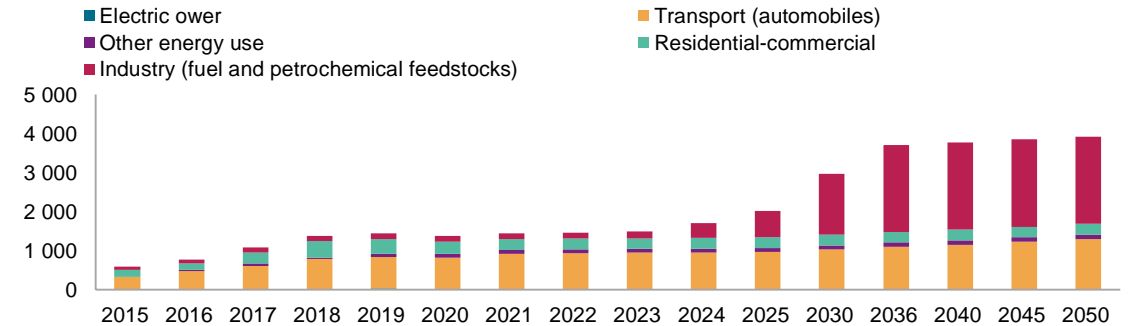


Source: S&P Global Commodity Insights, Kazakhstan's Bureau of National Statistics  
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Kazakhstan is expected to remain a sizable net exporter of LPGs through 2050, but TCO and PSA-type producers with export rights may come under greater pressure to provide more domestic deliveries

- Kazakhstan's LPG production is expected to nearly double – to almost 5.7 MMt by 2035 – but then drift slowly downward, to about 5.1 MMt in 2050
  - Key drivers for higher LPG output are the new petrochemical operations and their substantial demand for feedstock
  - Many of the new petrochemical operations will be producing LPGs at their own separation facilities, reaching about 2.1 MMt/y in 2035
  - In contrast, LPG output by GPZs is expected to decline longer term after a jump in the intermediate period (being tied to the amount of gas being processed, its trajectory resembles that of commercial gas production)
  - LPG output from refineries is expected to increase only moderately, expanding with refinery throughput
- Petrochemical producers will be consuming much more, but other consumption is expected to remain generally flat
  - Increasing in some sectors (transportation), while declining in others (e.g. residential with expansion of piped gas)

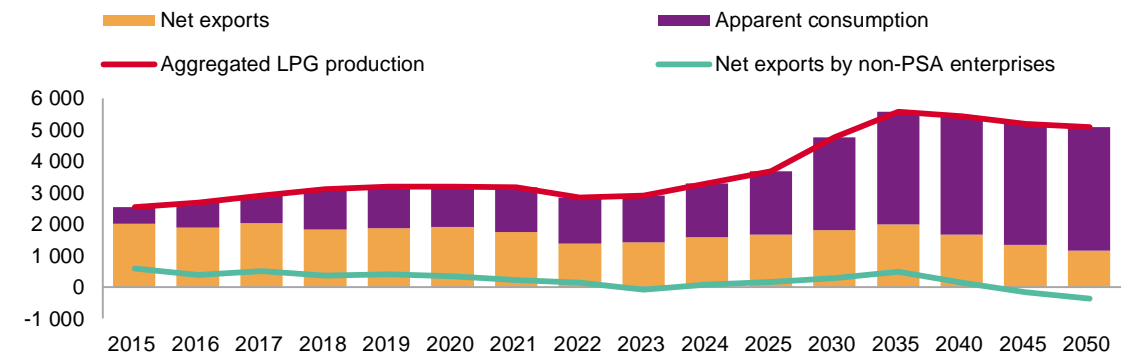
Kazakhstan's LPG demand outlook by sector to 2050, thousand tons



Source: S&P Global Commodity Insights.

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Kazakhstan's LPG balance to 2050, thousand tons per year

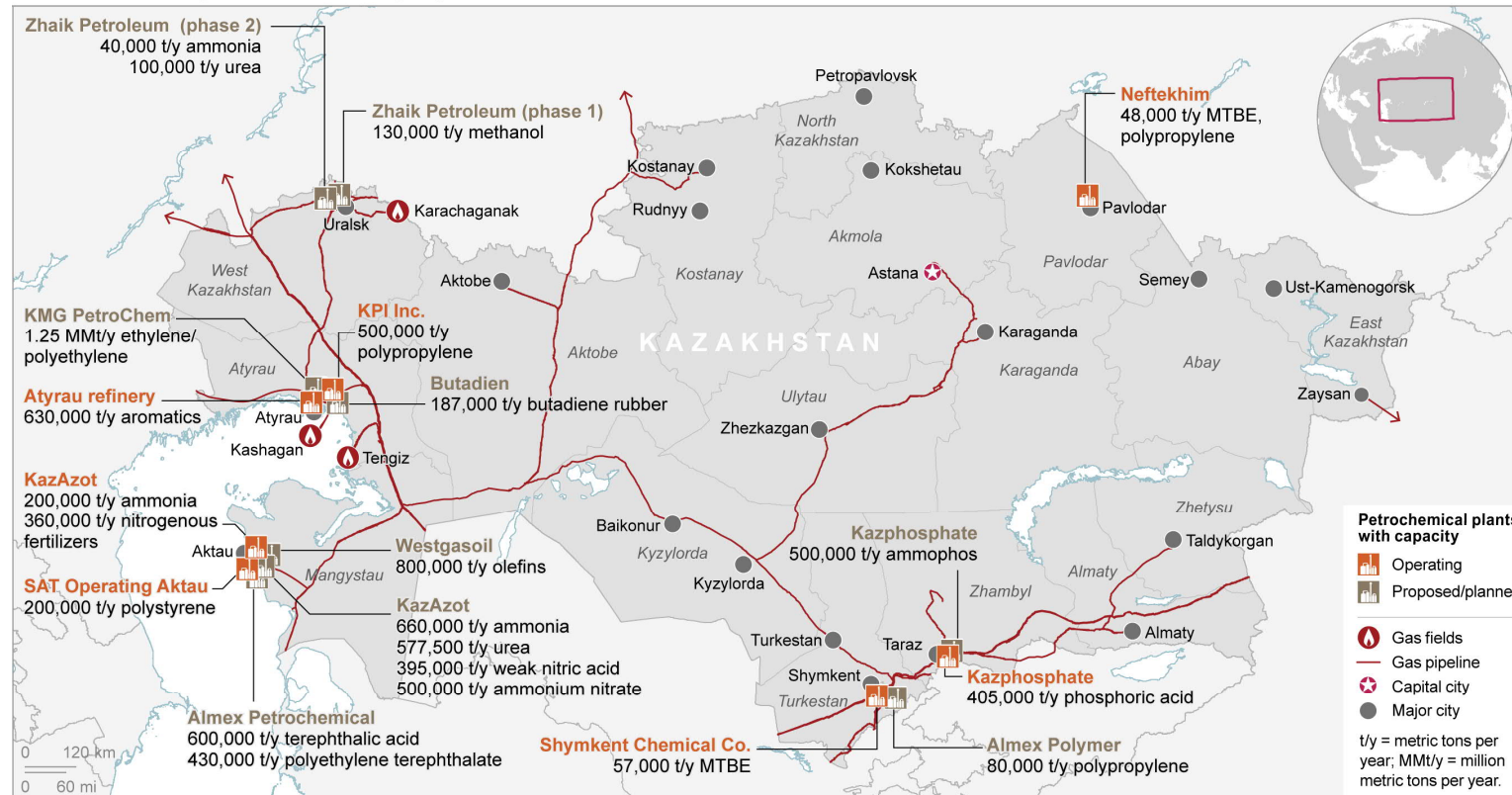


Source: S&P Global Commodity Insights.

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# New petrochemical projects are going to become a major growth driver for domestic LPG consumption (and other gas-based feedstocks)

## Kazakhstan's petrochemical projects



Data compiled July 18, 2023.

Source: S&P Global Commodity Insights upstream E&P/midstream content (EDIN) 2009853.

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These include:

- KPI: polypropylene (500,000 tons/y)
- Atyrau (KMG Petchem) polyethylene: 1.25 MMt/y
- Butadien: 187,000 tons/y of butadiene rubber
- Almex Polymer: 80,000 tons/y of polypropylene
- Almex Petrochemical: 430,000 tons/y of PET and 600,000 tons/y of terephthalic acid
- Westgasoil: 800,000 tons/y olefins
- Zhaik Petroleum: 130,000 tons/y methanol
- KazAzot: 200,000 tons/y ammonia and 360,000 tons/y fertilizers



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