

Kazakhstan

Rail Sector Profile

Population (2023)
19.6 Million

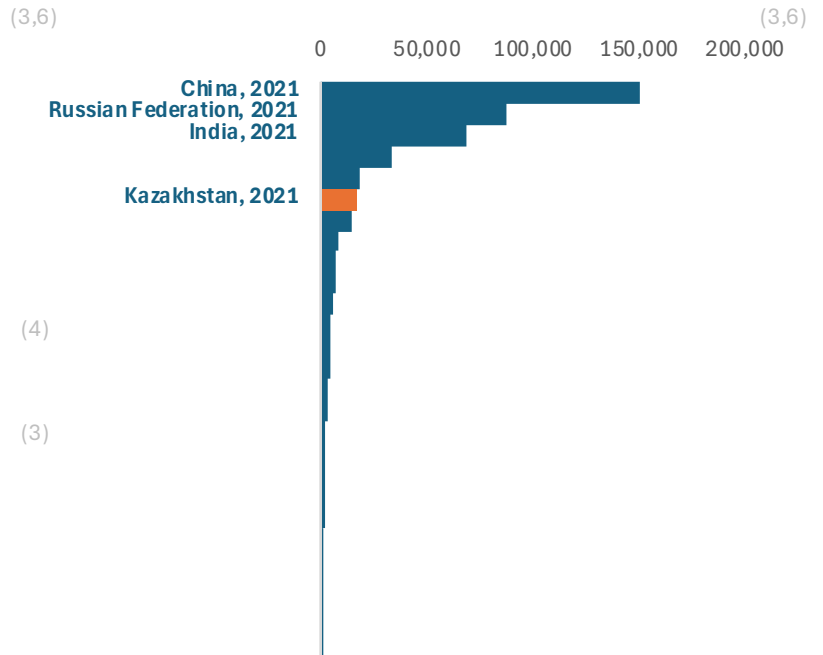
Gross domestic product (GDP), PPP (2022)
604.6 Billion USD (1,2)

PPP = Purchasing power parity

Heavy Railway

Heavy rail route length (2021)
16,580 km

Heavy railway route lengths in Asia-Pacific (kilometers)



Between 2003 to 2021, Kazakhstan added 1931.6 kilometers of heavy railway routes, expanding 0.7% annually

Single-track routes (2021) **68.6%** Double-track routes (2020) **n.d.**

Electrified routes **n.d.**

Between 2000 to 2021, Kazakhstan added 765.5 kilometers of electrified routes, expanding 1.0% annually

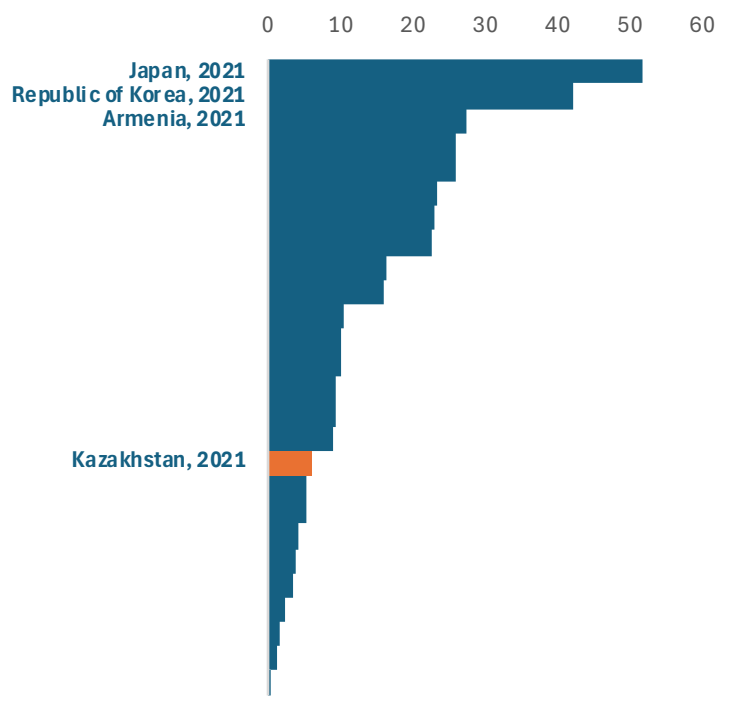
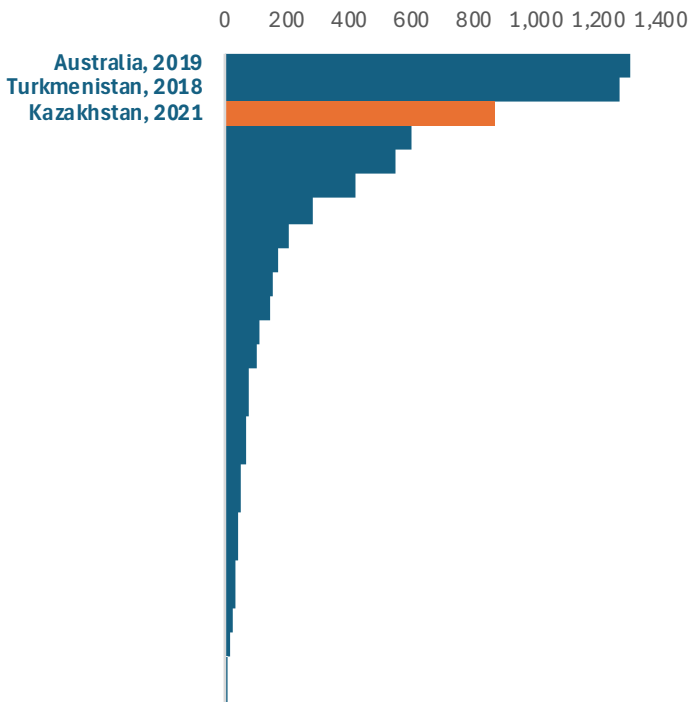
Availability per capita
863.7 kilometers per million population

Density per sqkm
6.1 kilometers per thousand sqkm

sqkm = square kilometer

Availability per capita in Asia-Pacific

Density per sqkm in Asia-Pacific



This rail sector profile was developed by the Asian Transport Outlook (ATO) with the contribution by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), which provided information on the Trans-Asian Railway Network routes. The ATO is an initiative developed under TA-6763 REG: Accelerating Innovation in Transport - Asian Transport Outlook: Phase 3 (55119-001) of the Asian Development Bank (ADB) and is also being supported by the Asian Infrastructure Investment Bank (AIIB) through Purchase Order No. CW39446 AIIB Support: Asian Transport Outlook Phase 3.

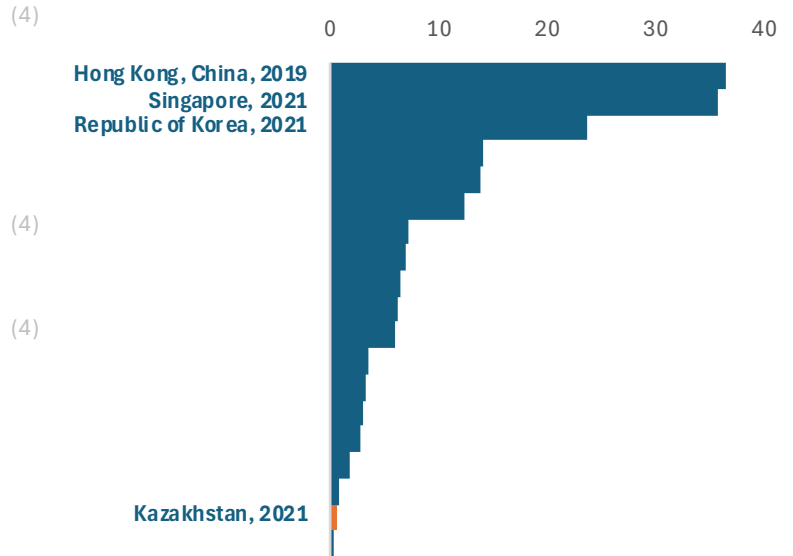
The Asian Transport Outlook (ATO) project collects, collates, and organizes data from publicly available official, as well as reputable and peer-reviewed secondary sources, which may contain incomplete or inconsistent data. It is important to note that the ATO does not generate data. Moreover, while the ATO carries out quality control and assurance of whether the data are truthfully reflected in the ATO, the ATO does not make any warranties or representations as to the appropriateness, quality, accuracy, or completeness of the data in the ATO databases, and in the knowledge products that are produced from such. Users are encouraged to scrutinize, verify, interpret, and judge the data before utilizing them.

Urban Railway

Metro length (2021)
8 km

Light rail transit (LRT) length
n.d.

Urban rail availability per capita in Asia-Pacific



Between 2011 to 2021, Kazakhstan added 0.0 kilometers of urban railway, expanding 0.0% annually

Number of cities with urban rail systems (2021)
1

Urban rail availability per capita (2021)
0.7 km per million urban population

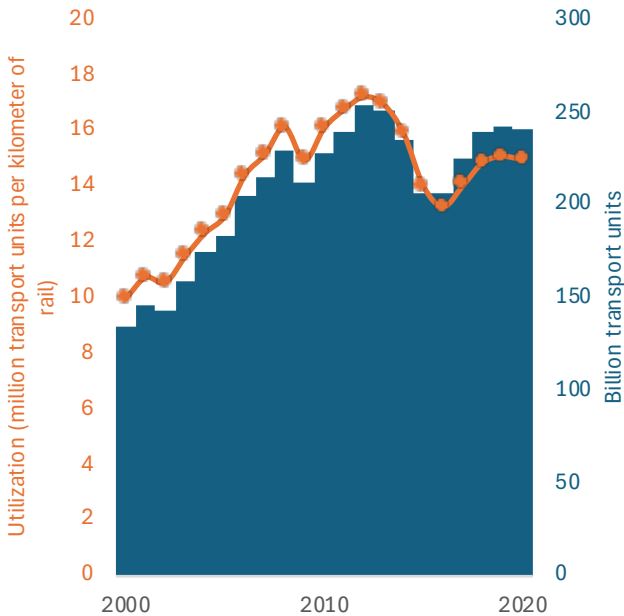
Activity

Passenger-kilometers (PKM) (2020)
8.6 billion

Tonne-kilometers (TKM) (2020)
231.8 billion

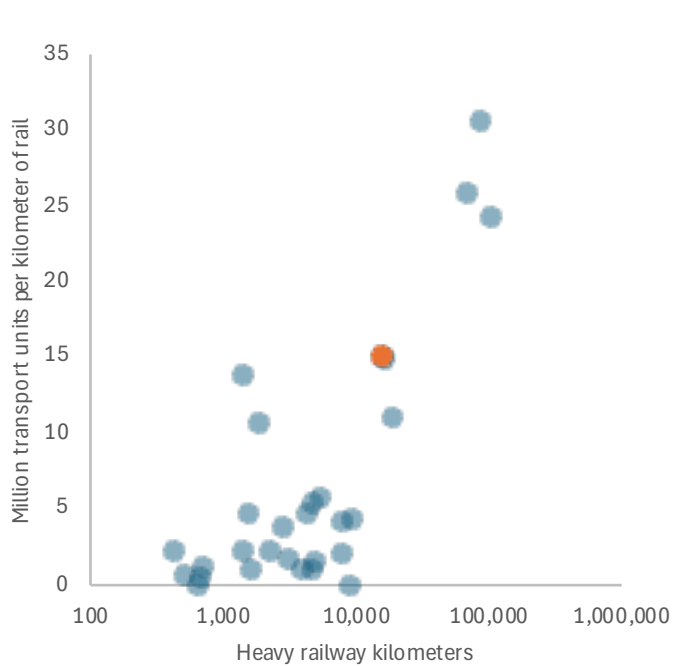
Between 2000 to 2020, PKM decreased annually by -0.9%. Between 2000 to 2020, TKM increased annually by 3.1%

Transport units and utilization trend



Transport units = passenger-kilometers + tonne-kilometers

Utilization of railways in Asia-Pacific

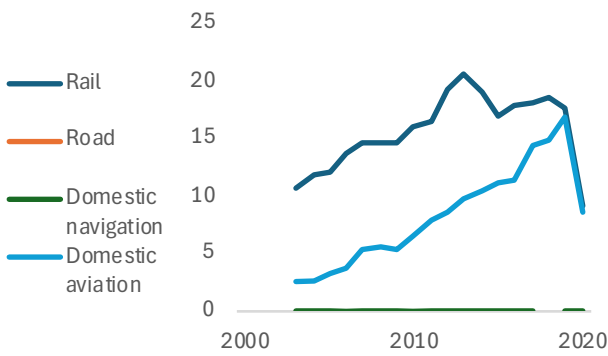


This rail sector profile was developed by the Asian Transport Outlook (ATO) with the contribution by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), which provided information on the Trans-Asian Railway Network routes. The ATO is an initiative developed under TA-6763 REG: Accelerating Innovation in Transport - Asian Transport Outlook: Phase 3 (55119-001) of the Asian Development Bank (ADB) and is also being supported by the Asian Infrastructure Investment Bank (AIIB) through Purchase Order No. CW39446 AIIB Support: Asian Transport Outlook Phase 3.

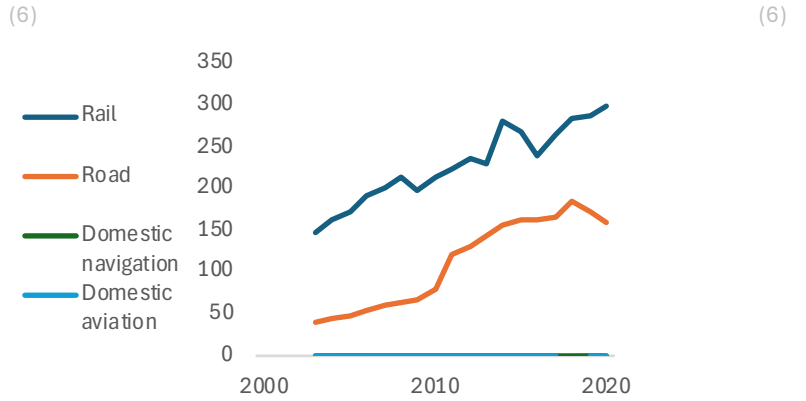
The Asian Transport Outlook (ATO) project collects, collates, and organizes data from publicly available official, as well as reputable and peer-reviewed secondary sources, which may contain incomplete or inconsistent data. It is important to note that the ATO does not generate data. Moreover, while the ATO carries out quality control and assurance of whether the data are truthfully reflected in the ATO, the ATO does not make any warranties or representations as to the appropriateness, quality, accuracy, or completeness of the data in the ATO databases, and in the knowledge products that are produced from such. Users are encouraged to scrutinize, verify, interpret, and judge the data before utilizing them.

Mode Share

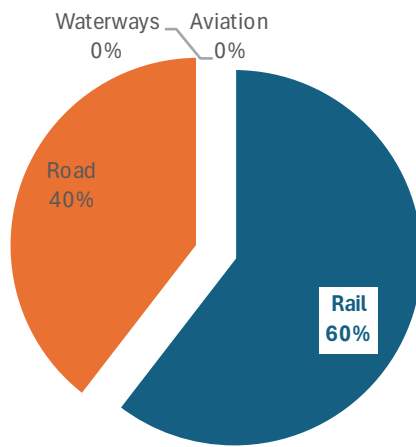
Passenger transport activity (billion passenger-km)



Freight transport activity (billion tonne-km)



Freight transport mode share (2018)



Energy

Rail diesel consumption (2017)
261 thousand tonnes

Rail electricity consumption (2020)
2938.584 million kWh

Rail energy intensity with GDP (MJ per USD, PPP)

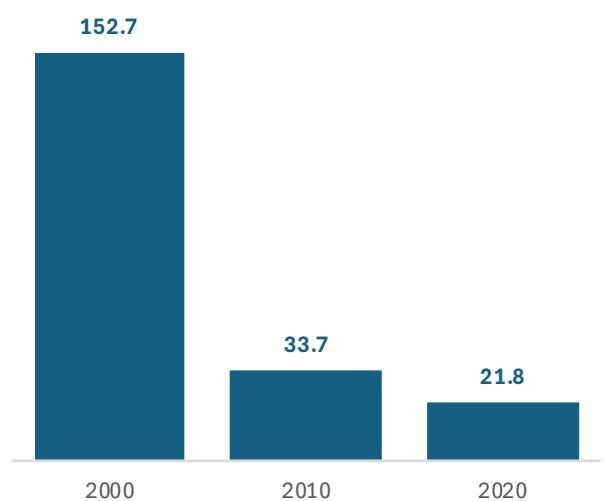
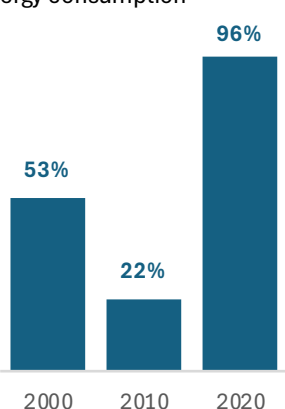
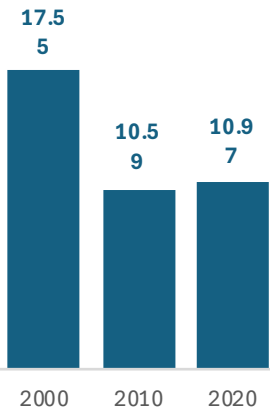
Rail energy consumption (PJ)

Share of electricity in rail energy consumption

(5)

(2,5)

kWh = kiloWatt-hour



PJ = petajoule

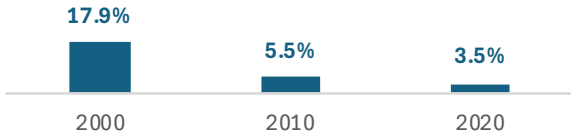
MJ = megajoule

This rail sector profile was developed by the Asian Transport Outlook (ATO) with the contribution by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), which provided information on the Trans-Asian Railway Network routes. The ATO is an initiative developed under TA-6763 REG: Accelerating Innovation in Transport-Asian Transport Outlook: Phase 3 (55119-001) of the Asian Development Bank (ADB) and is also being supported by the Asian Infrastructure Investment Bank (AIIB) through Purchase Order No. CW39446 AIIB Support: Asian Transport Outlook Phase 3.

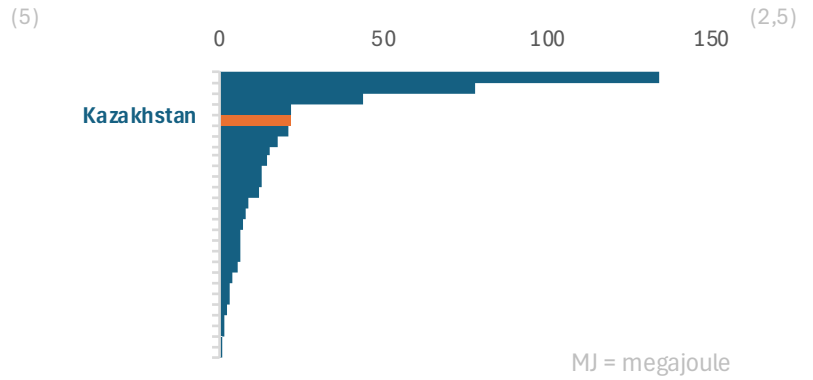
The Asian Transport Outlook (ATO) project collects, collates, and organizes data from publicly available official, as well as reputable and peer-reviewed secondary sources, which may contain incomplete or inconsistent data. It is important to note that the ATO does not generate data. Moreover, while the ATO carries out quality control and assurance of whether the data are truthfully reflected in the ATO, the ATO does not make any warranties or representations as to the appropriateness, quality, accuracy, or completeness of the data in the ATO databases, and in the knowledge products that are produced from such. Users are encouraged to scrutinize, verify, interpret, and judge the data before utilizing them.

Energy

Share of rail in total transport energy consumption

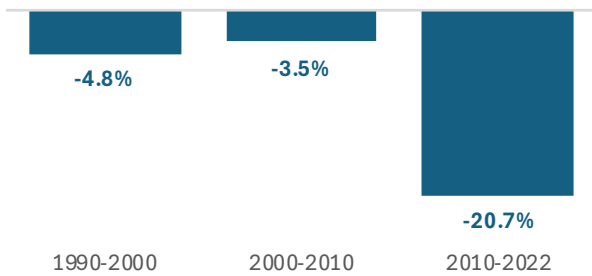


Rail energy intensity with GDP in Asia-Pacific (MJ per USD, PPP, 2020)



Rail CO2 emissions (2022)
37 thousand tonnes

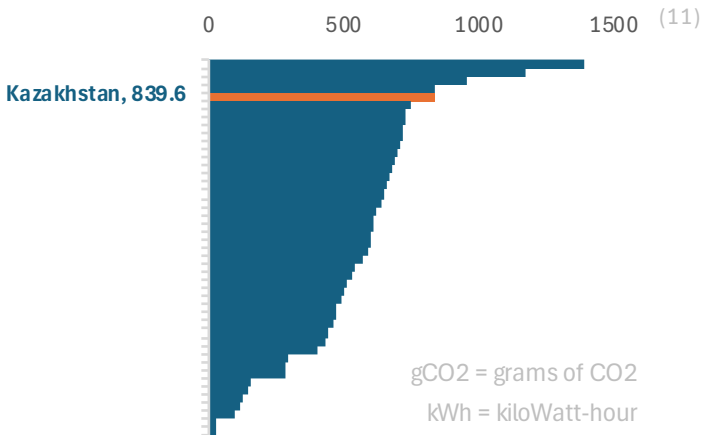
Rail CO2 emissions annual average growth



Share of rail in transport CO2 emissions (1990-2022)

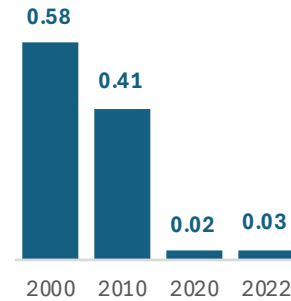


Grid emission factors (gCO2/kWh, 2022)



PM 10

(10) Rail air pollutant emissions (thousand tonnes)

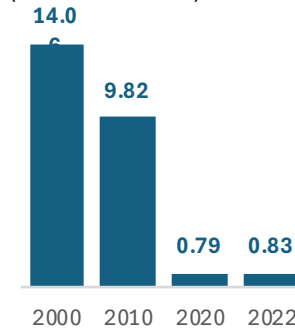


Share of rail in transport air pollutant emissions (2000-2022)

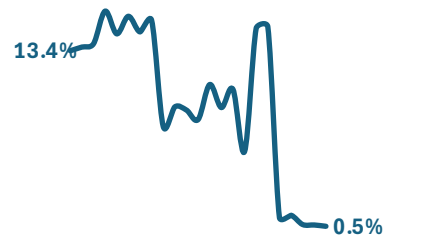


NOx

(10) Rail air pollutant emissions (thousand tonnes)

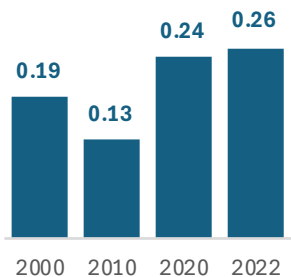


Share of rail in transport air pollutant emissions (2000-2022)

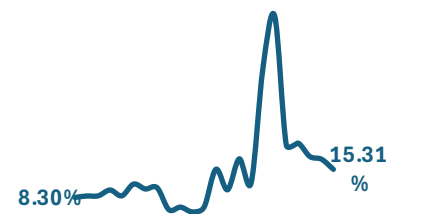


SOx

Rail air pollutant emissions (thousand tonnes)



Share of rail in transport air pollutant emissions (2000-2022)



This rail sector profile was developed by the Asian Transport Outlook (ATO) with the contribution by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), which provided information on the Trans-Asian Railway Network routes. The ATO is an initiative developed under TA-6763 REG: Accelerating Innovation in Transport - Asian Transport Outlook: Phase 3 (55119-001) of the Asian Development Bank (ADB) and is also being supported by the Asian Infrastructure Investment Bank (AIIB) through Purchase Order No. CW39446 AIIB Support: Asian Transport Outlook Phase 3.

The Asian Transport Outlook (ATO) project collects, collates, and organizes data from publicly available official, as well as reputable and peer-reviewed secondary sources, which may contain incomplete or inconsistent data. It is important to note that the ATO does not generate data. Moreover, while the ATO carries out quality control and assurance of whether the data are truthfully reflected in the ATO, the ATO does not make any warranties or representations as to the appropriateness, quality, accuracy, or completeness of the data in the ATO databases, and in the knowledge products that are produced from such. Users are encouraged to scrutinize, verify, interpret, and judge the data before utilizing them.

Investment

Public-private partnership (PPP) investments in rail (Million USD)



Official development assistance (ODA) in rail (Million USD)



Share of rail in transport PPP

| Between 2000-2015

88%

| Between 2016-2022

n.d.

Share of rail in transport ODA

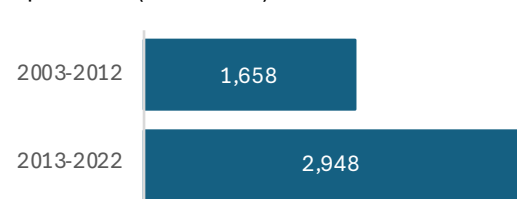
| Between 2002-2015

5%

| Between 2016-2021

7%

Import value (Million USD)



National investment in rail - capital expenditure (2020)

156 mln. USD

Includes locomotives, railcars, passenger coaches, freight wagons, rail fixtures, rolling stock parts, and containers

Digitalisation

Internet speed (2022)

| Broadband

63 Mbps

| Mobile

32 Mbps

Mbps = Megabits per second

Digital readiness index (2021)

0.2/2.5

Share of transport in gross value added (GVA) (2022)

8.8%

Average annual losses to rail infrastructure due to all potential hazards (2023)

19.50 mln. USD

Quality of railway infrastructure (2017)

4.1/7

Share of rail infrastructure in multihazard average annual loss to transport infrastructure (2023)

60.7%

Percent of firms identifying transportation as a major constraint - services (2015)

15.3%

Efficiency of train services (2019)

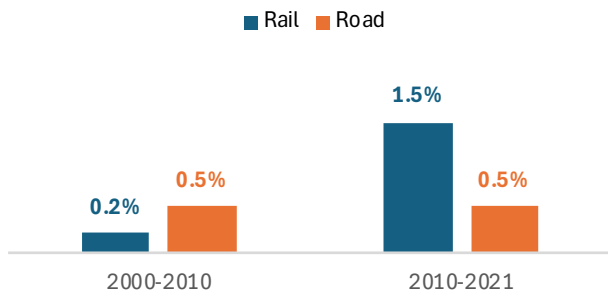
4.2/7

This rail sector profile was developed by the Asian Transport Outlook (ATO) with the contribution by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), which provided information on the Trans-Asian Railway Network routes. The ATO is an initiative developed under TA-6763 REG: Accelerating Innovation in Transport - Asian Transport Outlook: Phase 3 (55119-001) of the Asian Development Bank (ADB) and is also being supported by the Asian Infrastructure Investment Bank (AIIB) through Purchase Order No. CW39446 AIIB Support: Asian Transport Outlook Phase 3.

The Asian Transport Outlook (ATO) project collects, collates, and organizes data from publicly available official, as well as reputable and peer-reviewed secondary sources, which may contain incomplete or inconsistent data. It is important to note that the ATO does not generate data. Moreover, while the ATO carries out quality control and assurance of whether the data are truthfully reflected in the ATO, the ATO does not make any warranties or representations as to the appropriateness, quality, accuracy, or completeness of the data in the ATO databases, and in the knowledge products that are produced from such. Users are encouraged to scrutinize, verify, interpret, and judge the data before utilizing them.

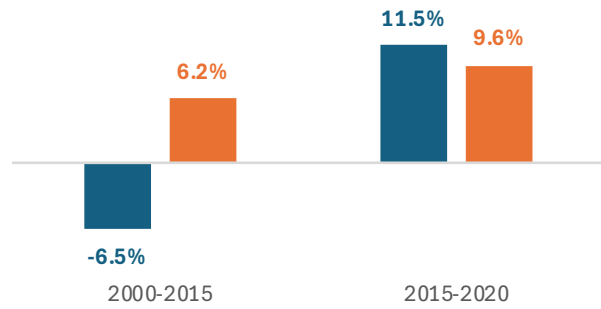
Benchmarking Rail and Road Sectors

Infrastructure annual average growth of rail (including HSR, LRT, and metro) vs. road



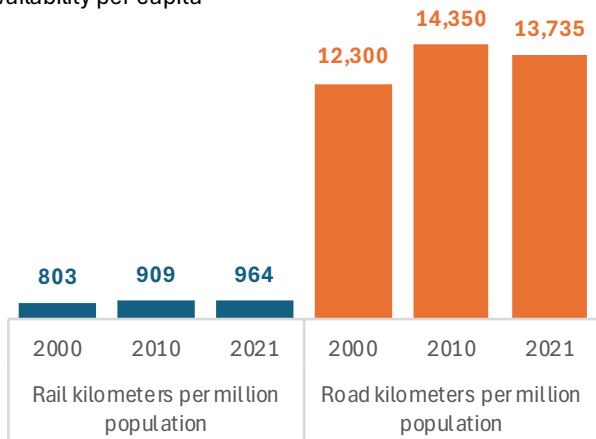
(3,6)

Rail vs. road energy consumption annual average growth rate



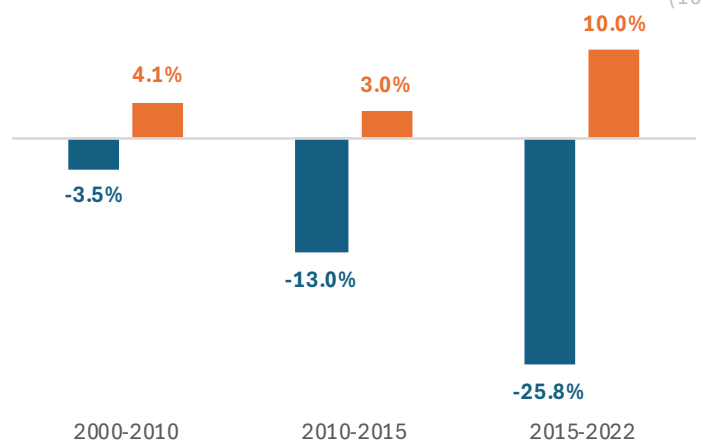
(5)

Rail (including HSR, LRT, and metro) vs. road infrastructure availability per capita



(3,6)

Rail vs. road CO2 emissions annual average growth rate



(10)

Sources

(1) UN Population Database (2022), <https://population.un.org/wpp/>
 (2) World Bank (2022), <https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.CD>
 (3) International Union of Railways (2021), <https://uic-stats.uic.org/>
 (4) Rapid Transit Database (ITDP, 2022), <https://www.itdp.org/rapid-transit-database/>
 (5) UN Energy Statistics (2021), <https://unstats.un.org/unsd/energystats/dataPortal/>
 (6) Country Official Statistics
 (7) Rail Company
 (8) OOKLA (2023), <https://worldpopulationreview.com/countries/internet-speeds-by-country/>
 (9) CISCO (2022), <https://www.cisco.com/c/en/us/about/csr/research-resources/digital-readiness.html>
 (10) Emissions Database for Global Atmospheric Research (EC, 2023), <https://edgar.jrc.ec.europa.eu/>
 (11) Ember (2023), <https://ember-climate.org/data-catalogue/yearly-electricity-data/>
 (12) UN Statistics (2022), <https://unstats.un.org/unsd/snaama/Downloads>

(13) World Economic Forum (2019), http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf
 (14) World Bank (2020), <https://datacatalog.worldbank.org/dataset/enterprise-surveys>
 (15) Koks, et al. (2019), <https://www.nature.com/articles/s41467-019-10442-3>
 (16) World Economic Forum (2019), https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf
 (17) PPI Database (World Bank, 2023), <https://ppi.worldbank.org/en/ppi>
 (18) Organisation for Economic Co-operation and Development (OECD) (2022), <https://stats.oecd.org/Index.aspx?DataSetCode=CRS1#>
 (19) Country Data
 (20) Trademap (ITC, 2024), <https://www.trademap.org/>
 (21) Global Infrastructure Risk Model and Resilience Index (CDRI, 2023), <https://giri.unepgrid.ch/>

This rail sector profile was developed by the Asian Transport Outlook (ATO) with the contribution by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), which provided information on the Trans-Asian Railway Network routes. The ATO is an initiative developed under TA-6763 REG: Accelerating Innovation in Transport - Asian Transport Outlook: Phase 3 (55119-001) of the Asian Development Bank (ADB) and is also being supported by the Asian Infrastructure Investment Bank (AIIB) through Purchase Order No. CW39446 AIIB Support: Asian Transport Outlook Phase 3.

The Asian Transport Outlook (ATO) project collects, collates, and organizes data from publicly available official, as well as reputable and peer-reviewed secondary sources, which may contain incomplete or inconsistent data. It is important to note that the ATO does not generate data. Moreover, while the ATO carries out quality control and assurance of whether the data are truthfully reflected in the ATO, the ATO does not make any warranties or representations as to the appropriateness, quality, accuracy, or completeness of the data in the ATO databases, and in the knowledge products that are produced from such. Users are encouraged to scrutinize, verify, interpret, and judge the data before utilizing them.

Kazakhstan Rail Network



Border Crossings to/from Kazakhstan

Source: UNESCAP

Country	Border Crossing
Kazakhstan - Uzbekistan	Sary-Agach-Keles
Kazakhstan - Russian Federation	Tobol (Aksu)-Kartaly
Kazakhstan - Russian Federation	Ganyushkino (Diny Nurpieisowo)-Aksaraiskaya (Kigrash)
Kazakhstan - Russian Federation	Zernowaya-Zauralje
Kazakhstan - Russian Federation	Kurkamys-Kulunda
Kazakhstan - Russian Federation	Petropavlosk-Petukhovo (Petropavlosk)
Kazakhstan - Russian Federation	Nikeltau (Kirgilda)-Orsk
Kazakhstan - Russian Federation	Aul-Lokot
Kazakhstan - Kyrgyzstan	Lugovaya-Bishkek
Kazakhstan - Russian Federation	Semiglavii Mar-Ozinki
Kazakhstan - Russian Federation	Uralsk (Chinghirlau)-Iletsk I
Kazakhstan - Russian Federation	Aktobe-Iletsk
Kazakhstan - Uzbekistan	Oazis-Karakalpakia
Kazakhstan - China	Dostyk-Alashankou

This rail sector profile was developed by the Asian Transport Outlook (ATO) with the contribution by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), which provided information on the Trans-Asian Railway Network routes. The ATO is an initiative developed under TA-6763 REG: Accelerating Innovation in Transport - Asian Transport Outlook: Phase 3 (55119-001) of the Asian Development Bank (ADB) and is also being supported by the Asian Infrastructure Investment Bank (AIIB) through Purchase Order No. CW39446 AIIB Support: Asian Transport Outlook Phase 3.

The Asian Transport Outlook (ATO) project collects, collates, and organizes data from publicly available official, as well as reputable and peer-reviewed secondary sources, which may contain incomplete or inconsistent data. It is important to note that the ATO does not generate data. Moreover, while the ATO carries out quality control and assurance of whether the data are truthfully reflected in the ATO, the ATO does not make any warranties or representations as to the appropriateness, quality, accuracy, or completeness of the data in the ATO databases, and in the knowledge products that are produced from such. Users are encouraged to scrutinize, verify, interpret, and judge the data before utilizing them.

Trans-Asian Railway Lines in Kazakhstan

Source: UNESCAP

Line	Length (km)
Petropavlosk – Dostyk	1,896
Samiglavii Mar – Aktogai	3,488
Asatana – Tobol	664
Mointy – Chu	446
Aktogai – Aul	578
Kandagach – Border of Russia	218
Kandagash – Border of Russia	815
Arys – Sary-Agash	128
Tobol – Kandagach	644
Makat – Oasis	380
Beyneu – Aktau port	408

Total distance 9,665 km

This rail sector profile was developed by the Asian Transport Outlook (ATO) with the contribution by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), which provided information on the Trans-Asian Railway Network routes. The ATO is an initiative developed under TA-6763 REG: Accelerating Innovation in Transport - Asian Transport Outlook: Phase 3 (55119-001) of the Asian Development Bank (ADB) and is also being supported by the Asian Infrastructure Investment Bank (AIIB) through Purchase Order No. CW39446 AIIB Support: Asian Transport Outlook Phase 3.

The Asian Transport Outlook (ATO) project collects, collates, and organizes data from publicly available official, as well as reputable and peer-reviewed secondary sources, which may contain incomplete or inconsistent data. It is important to note that the ATO does not generate data. Moreover, while the ATO carries out quality control and assurance of whether the data are truthfully reflected in the ATO, the ATO does not make any warranties or representations as to the appropriateness, quality, accuracy, or completeness of the data in the ATO databases, and in the knowledge products that are produced from such. Users are encouraged to scrutinize, verify, interpret, and judge the data before utilizing them.

Policy Measures and Targets

Policy document	Year	Rail-related measures
Strategic Development Plan until 2025	2018	
Energy Efficiency-2020 Program	2013	General rail improvement
Concept for transition of the Republic of Kazakhstan to Green Economy	2013	General rail improvement
ORDER OF THE MINISTER OF INVESTMENTS AND DEVELOPMENT OF THE REPUBLIC OF KAZAKHSTAN of March 31, 2015 No. 389 About establishment of requirements for transport energy efficiency	2015	
LAW OF THE REPUBLIC OF KAZAKHSTAN of December 8, 2001 No. 266-II About rail transport	2001	

This rail sector profile was developed by the Asian Transport Outlook (ATO) with the contribution by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), which provided information on the Trans-Asian Railway Network routes. The ATO is an initiative developed under TA-6763 REG: Accelerating Innovation in Transport - Asian Transport Outlook: Phase 3 (55119-001) of the Asian Development Bank (ADB) and is also being supported by the Asian Infrastructure Investment Bank (AIIB) through Purchase Order No. CW39446 AIIB Support: Asian Transport Outlook Phase 3.

The Asian Transport Outlook (ATO) project collects, collates, and organizes data from publicly available official, as well as reputable and peer-reviewed secondary sources, which may contain incomplete or inconsistent data. It is important to note that the ATO does not generate data. Moreover, while the ATO carries out quality control and assurance of whether the data are truthfully reflected in the ATO, the ATO does not make any warranties or representations as to the appropriateness, quality, accuracy, or completeness of the data in the ATO databases, and in the knowledge products that are produced from such. Users are encouraged to scrutinize, verify, interpret, and judge the data before utilizing them.

Infrastructure and Activity

- **Heavy rail network:** Kazakhstan boasts a substantial heavy rail infrastructure, spanning 16,076 kilometers, translating to 85.1 kilometers per million population in 2021.
 - 82% of these routes are single-track, while 18% are double-track.
 - Between 2006 and 2021, the country added a significant 2,673 kilometers of heavy railway routes.
 - In terms of land area, Kazakhstan has 6.4 kilometers of heavy railway infrastructure per thousand square kilometers.
 - 26% of the rail routes are electrified.
- **Urban rail network:** Currently, only one city in Kazakhstan has a rapid urban transit system.
 - In 2021, there were 28 kilometers of rapid urban transit, primarily consisting of LRT (82%) and a smaller portion of MRT (18%).
 - Between 2016 and 2021, Kazakhstan added 28 kilometers of urban railway.
 - By 2021, the country had 1.4 kilometers of rapid urban transit per million urban population.
- **Activity:** In 2018, Kazakhstan transported 33.1 billion passenger-kilometers and 242.4 billion tonne-kilometers.
 - Between 2000 and 2018, passenger kilometers decreased annually by -0.9%, while tonne-kilometers increased by 3.3%.
 - As a measure of rail utilization, in 2010, Kazakhstan had 12.9 million transport units per kilometer of heavy railways. This decreased to 9.7 by 2015 and further to 8.6 by 2020.
- **Energy Consumption:** The rail sector in Kazakhstan consumed 20.8 PJ of energy in 2020, a slight decrease from 21.7 PJ in 2010.
 - The rail sector's electricity consumption grew from 3% in 2010 to 5% in 2020.
 - Rail consumed about 1.9% of the total energy in 2020 compared to the entire transport sector.
 - Kazakhstan's rail sector consumed 10 MJ per USD of GDP in 2000. By 2020, this improved to 8 MJ per USD of GDP.

Emissions, Investments, and Policy

- **Emissions:** In 2020, Kazakhstan's rail sector emitted 1.4 million tonnes of CO₂, contributing to about 0.5% of total transport fossil CO₂ emissions.
 - The grid emission factor in 2021 was 726 gCO₂ per kWh, higher than 684 in 2010.
 - The rail sector contributed 0.3%, 0.4%, and 0.7% to total fossil transport PM₁₀, NO_x, and SO_x emissions, respectively, in 2022.
- **Investments:** Between 2000 and 2015, Kazakhstan saw 250 million USD in public-private partnership investments in the rail sector. This increased to 850 million USD between 2016 and 2022. The rail sector received 5% of total transport PPP investments between 2016 and 2022.
 - The country received 543 million USD in official development assistance (ODA) for the rail sector between 2002 and 2015 and 1,392 million USD between 2016 and 2021. The rail sector received 27% of total transport ODA between 2016 and 2021.
 - Rolling stock and rail fixture imports amounted to 834 million USD between 2003 and 2012 and increased to 1,474 million USD between 2013 and 2022.
- **Policy:** Key policy documents include the National Railways Master Plan, Strategic Plan for the Railway Sector 2020-2024, National Medium-Term Development Plan 2020-2024, and others.
 - These documents outline various measures related to rail infrastructure expansion, urban passenger rail improvement, high-speed railways, general rail improvement, renewable energy, and more.
 - Specific targets include increasing the passenger market share to 7-9% and goods market share to 11-13%, reducing technological dependence, and expanding the national railway network.
- **NDC Gaps and Alignment:** While Kazakhstan has set ambitious targets for its rail sector, there are gaps in aligning these targets with its Nationally Determined Contributions (NDCs) under the Paris Agreement.
 - Further integration of climate change mitigation and adaptation strategies into rail policies is crucial.
 - There's potential for greater emphasis on electrification and renewable energy adoption in the rail sector to reduce emissions.

Policy Priorities and Opportunities:

Kazakhstan has a unique opportunity to leverage its rail sector for significant emissions reductions and sustainable growth. By prioritizing the electrification of rail lines and integrating renewable energy sources, Kazakhstan can considerably decarbonize its rail operations. Expanding urban rail networks and fostering intermodal connectivity can encourage a shift away from more polluting modes of transport, both for passengers and freight. Investing in climate-resilient infrastructure is essential to safeguard rail assets from the impacts of climate change, ensuring long-term sustainability. Finally, enhancing digitalization can improve efficiency, safety, and the overall passenger experience, making rail travel even more attractive. Kazakhstan can accelerate its rail development and contribute significantly to its climate goals by focusing on public-private partnerships and international collaboration.

Kazakhstan's rail sector is vital to the country's transport system and economy. While significant investments and developments in infrastructure and activity have been made, addressing climate change necessitates a stronger focus on decarbonization and aligning rail policies with national climate goals. The country can leverage its rail sector to contribute significantly to its NDC targets and create a more sustainable and resilient transport system.