



RAILWAY SECTOR ASSESSMENT FOR PEOPLE'S REPUBLIC OF CHINA

MARCH 2021

RAILWAY SECTOR ASSESSMENT FOR PEOPLE'S REPUBLIC OF CHINA

MARCH 2021



Note:

In this publication, “\$” refers to United States dollars.

ADB recognizes “China” as the People’s Republic of China.

Cover design by Edith Creus.

Photo credits on the cover, from left to right. Shenhua Railway uses both wagons and containers to move Tavan Tolgoi coal, Gans Mod station, Inner Mongolia. China Railways use open top wagons to move containers. China Railways train at Zuun-Khatavch station Inner Mongolia, across from Mongolia’s Bichigt BCP (photo by TA consultant).

Map: The boundaries, colors, denominations, and any other information shown on this map do not imply, on the part of ADB, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information.



CONTENTS

TABLES AND FIGURES	v
ACKNOWLEDGMENTS	vi
ABBREVIATIONS	vii
CURRENCY EQUIVALENTS	vii
1 INTRODUCTION AND BACKGROUND	1
A. Introduction	1
B. The PRC railway network	1
C. Institutional responsibilities for railways	4
D. Cross-border and transit traffic routes	6
E. Relevant CAREC corridors	9
2 TRENDS IN RAILWAY TRAFFIC	16
A. Introduction	16
B. Analysis of traffic	17
1. National trends in cross-border railway traffic	17
2. Trends in IMAR and XUAR cross-border railway traffic	18
C. Containerization	20
1. Trends in rail containerization	20
2. Containerization of cross-border railway traffic	21
3 MARKET COMPETITIVENESS	25
A. Introduction	25
B. Trends in market competitiveness	25
C. Market feedback	26
D. Problems affecting rail competitiveness	28
4 RAILWAY OPERATING AND FINANCIAL PERFORMANCE	30
A. Introduction	30
B. Financial performance	30
C. Operational benchmarking	32

5	PROPOSALS FOR INVESTMENT, COMMERCIALIZATION AND REFORM	35
	A. Introduction	35
	B. Policy setting	35
	1. Commercialization and reform	35
	C. Proposals for support from CAREC Railway Sector Development TA	36
	1. Prefeasibility studies	36
	2. Knowledge products and events	37
	APPENDIX: CAREC DESIGNATED RAIL CORRIDORS	38
	REFERENCES	40



TABLES AND FIGURES

TABLES

1.1 Subcorridors of CAREC Corridor 2	12
2.1 Trends in Freight Traffic by Mode, 1990–2018	16
2.2 Cross-border Railway Traffic by Commodity, 2013–2017	18
2.3 Trends in XUAR and IMAR Traffic Statistics, 2013–2018	19
2.4 Cross-border Freight Traffic by Rail Border Crossing Points, 2015–2018	20
2.5 Trends in Rail Container Traffic, 2013–2018	22
2.6 Number of Block Trains by Interchange Gateway, 2018	22
3.1 Market Feedback on Rail Competitiveness for Different Traffic Types	27
4.1 Highlights from China Railway Corporation Income Statement, 2016–2018	31
4.2 Highlights from China Railway Corporation Balance Sheet, 2016–2018	31

FIGURES

1.1 PRC Railway Map, 2018	3
1.2 China Railway Corporation Organization Chart	5
1.3 Regional Rail Links and Ports Serving Cross-border and Transit Traffic	6
1.4 Sections of CAREC Corridor 1 Relevant for the PRC	9
1.5 Sections of CAREC Corridor 2 Relevant for the PRC	11
1.6 Sections of CAREC Corridor 4 Relevant for the PRC	13
1.7 Sections of CAREC Corridor 5 Relevant for the PRC	15
2.1 Rail Freight Tonnage Trend, 2013–2019	17
2.2 Annual China Railway Corporation Container Volume	20
2.3 Coking Coal to be Loaded in China Railway Corporation Containers at Gans Mod Border Station, Inner Mongolia	21
2.4 Monitoring of PRC–Europe Container Block Trains from Xi'an	23
2.5 China Railway Corporation Intermodal Terminal	24
3.1 Rail Infrastructure Quality Rankings of Selected CAREC Member Countries	25
4.1 Comparison of Railway Length and Staff Size in the PRC, Other CAREC Member Countries and Other Leading Railway Countries	32
4.2 Comparison of Railway Rolling Stock Fleet in the PRC, Other CAREC Member Countries and Other Leading Railway Countries	33
4.3 Comparison of Annual Railway Freight and Passenger Traffic Levels in the PRC, Other CAREC Member Countries and Other Leading Railway Countries	33
4.4 Comparison of Railway Track and Staff Productivity in the PRC, other CAREC Member Countries and Other Leading Railway Countries	34
4.5 Comparison of Locomotive and Wagon Productivity in the PRC, other CAREC Member Countries and Other Leading Railway Countries	34



ACKNOWLEDGMENTS

This country railway sector assessment is part of an Asian Development Bank (ADB) technical assistance (TA) project on *Railway Sector Development in Central Asia Regional Economic Cooperation (CAREC) Countries*. The project has been assisting CAREC member countries to identify promising opportunities for investment in cross-border railways and develop railway commercialization and reform measures to strengthen railway performance in accordance with the CAREC Railway Strategy approved by CAREC ministers in 2017.

Preparation and supervision of the project was led by Jurgen Sluijter, Senior Transport Specialist, and overseen by Dong-Soo Pyo, Director, Transport and Communication Division, Central and West Asia Department. Administrative support was provided by Krisanta Carissa Vila, Associate Project Analyst.

The railway sector assessment for the People's Republic of China was prepared by a team of TA consultants. Country-level consultations and research were carried out by Andy Sze, Railway Market and Logistics Specialist and Jianhong Wu, Transport Specialist. Report preparation was led by Tyrrell Duncan, Team Leader/Railway Specialist.

Valuable insights and information were provided by China Railway Corporation, other government departments, international development partners and representatives of the private sector. Useful comments were provided by ADB staff.



ABBREVIATIONS

ADB	–	Asian Development Bank
BCP	–	border crossing point
BRI	–	Belt and Road Initiative
CAREC	–	Central Asia Regional Economic Cooperation
CCTA	–	China Communication Transport Association
CPEC	–	China-Pakistan Economic Corridor
CRC	–	China Railway Corporation
EBRD	–	European Bank for Reconstruction and Development
EEU	–	Eurasian Economic Union
FSU	–	former Soviet Union
HSR	–	high-speed rail
ICT	–	information and communication technology
IMAR	–	Inner Mongolia Autonomous Region
ITF	–	International Transport Forum
KTZ	–	Kazakhstan Temir Zholy (Kazakhstan Railways)
MC	–	Member Country
MOF	–	Ministry of Finance
MOT	–	Ministry of Transport
MOR	–	Ministry of Railways
NDRC	–	National Development and Reform Commission
OSJD	–	Organisation for Cooperation between Railways
PRC	–	People's Republic of China
RZD	–	Russian Railway
SOE	–	state-owned enterprise
TA	–	technical assistance
TEU	–	twenty-foot equivalent
TITR	–	Trans-Caspian International Transport Route
TIR	–	Transport International Routier
TRACECA	–	Transport Corridor Europe–Caucasus–Asia
TSR	–	Trans-Siberian Railway
UBTZ	–	Ulaanbaatar Railway
UIC	–	International Union of Railways
UTY	–	O'zbekiston Temir Yo'llari (Uzbekistan Railways)
WEF	–	World Economic Forum
XUAR	–	Xinjiang Uighur Autonomous Region

CURRENCY EQUIVALENTS

(as of 5 June 2020)

Currency unit	–	Yuan (CNY)
CNY1.00	=	\$0.141
\$1.00	=	CNY7.11

INTRODUCTION AND BACKGROUND

A. Introduction

1. In 2017, the eleven Member Countries (MCs) of the Central Asia Regional Economic Cooperation (CAREC) program approved the CAREC Railway Strategy with a view to expanding the role of railway transport in the region.¹ The strategy aims to accelerate the identification, preparation and financing of feasible railway investment projects and, at the same time, advance the commercialization and reform of railways to improve their performance (ADB 2017).

2. In 2018, the Asian Development Bank (ADB) approved a \$2 million regional technical assistance (TA) project for CAREC Railway Sector Development to assist MCs in implementation of the CAREC Railway Strategy (ADB 2018).² The TA is intended to accelerate the sound development of the railway sector in CAREC countries by providing support for railway transport market research, project identification and preparation, knowledge sharing and preparation of practical actions for commercialization and reform in MCs.

3. During the first part of TA implementation, the TA consultants conducted assessments of the railway sector in each MC. The purpose of these assessments was to examine the setting,

characteristics, performance and prospects of railways, and also to identify promising investment opportunities, as well as commercialization and reform actions that could be considered for support through the TA. This short report summarizes the findings of the railway sector assessment for the People's Republic of China (PRC), based on a country visit on 18–31 July 2019. Since the PRC's membership of CAREC focuses on two regions in the west and north of the country that have borders with other CAREC MCs, namely the Xinjiang Uygur Autonomous Region (XUAR) and Inner Mongolia Autonomous Region (IMAR), the role of the PRC's cross-border railways that pass through these regions is the main subject of the report. The TA Consultants wish to thank Che Tanlai, Deputy Secretary General of China Communication and Transport Association (CCTA) for his valuable assistance.

B. The PRC railway network

4. With a population of 1.4 billion, and occupying an area of 9.63 million square kilometers (km), the PRC is the most populous and third largest country in the world. It is now categorized as an upper middle-income country (ADB 2016). Since

¹ The eleven CAREC member countries are Afghanistan, Azerbaijan, People's Republic of China (specifically the Xinjiang Uygur Autonomous Region and the Inner Mongolia Autonomous Region), Georgia, Kazakhstan, Kyrgyz Republic, Mongolia, Pakistan, Tajikistan, Turkmenistan and Uzbekistan.

² The TA is cofinanced by the People's Republic of China (PRC) Poverty Reduction and Regional Cooperation Fund and the United Kingdom Fund for Asia Regional Trade and Connectivity (under the Regional Cooperation and Integration Financing Partnership Facility).

1978, when it began “reform and opening up,” it has rapidly industrialized and achieved high rates of economic growth. Between 1978 and 2018, gross domestic product increased at an average annual rate of 9.4% (National Bureau of Statistics 2019). Growth rates have moderated to between 6% and 7% in the recent years (ADB 2019a). Trade has been a major driver of industrialization and economy. The PRC is now the world’s largest exporter of goods and second largest importer (World Trade Organization 2019).

5. The government realized early on that a good quality transport system is needed to support the import of raw materials and export of manufactured goods and will also contribute to the living standard of citizens by enabling mobility, access to health care, education and recreation. Transport system development has therefore been a cornerstone of the PRC’s economic development policies. Within the span of one generation, the PRC has developed a world class rail and road network, as well as an effective inland waterway network and most of the world’s biggest sea ports. The PRC railway network is now one of the world’s largest and most heavily used.

6. As of 2018, the PRC has invested more than CNY800 billion in railway fixed assets and expanded its total track length to 131,000 km, including 29,000 km of high-speed rail (HSR) lines (Figure 1.1). Total track length is planned to reach 150,000 km by 2020, including 30,000 km of HSR lines. By 2025, the HSR system is planned to reach 38,000 km. Under the 13th Five Year Plan, 2016–2020, it is expected that 60–70% of railway freight network will be double-tracked and 65% will be electrified.

7. In recent years, the government has prioritized the integration of different transport modes to provide a seamless multimodal service. Among the cities to have built major multimodal terminals³ are Shanghai, Guangzhou, Zhengzhou, Wuhan, Chongqing, Kunming, Tianjin, Shenyang, Xian, Lanzhou, and Urumqi.

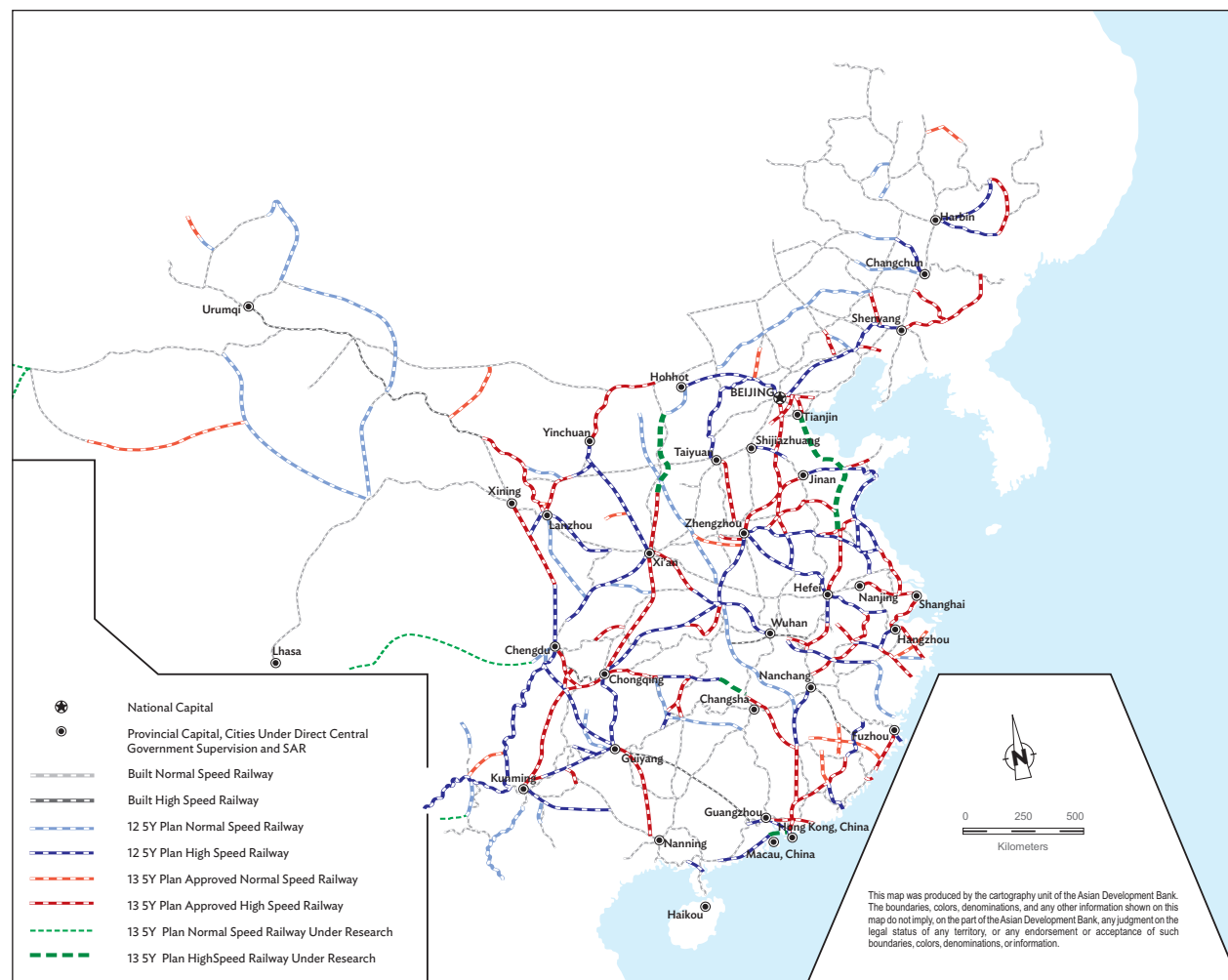
8. The PRC rail network has three main gateway connections with CAREC MCs. These are at Alashankou/Dostyk and Khorgos/Altynkol at the Kazakhstan border where traffic connects with Kazakhstan Railways (KTZ), and at Erenhot/Zamyn Uud at the Mongolia border to connect with Mongolian Railways (UBTZ). Another important gateway that indirectly serves some CAREC traffic and competes with CAREC corridors is at Manzhouli/Zabaykalsk on the PRC’s IMAR border with the Russian Federation.⁴ These are shown in Figure 1.1.

9. The Alashankou/Dostyk and Khorgos/Altynkol gateways serve traffic to and from Central Asia, Europe, the Russian Federation and the Middle East. Most of the traffic to and from the Russian Federation uses the Alashankou/Dostyk gateway to connect in the north with the Russian Federation’s Trans-Siberian Railway (TSR). Traffic to most other destinations and most container block trains use the Khorgos/Altynkol gateway. The Mongolian gateway mainly serves PRC trade with the Russian Federation and Europe via the TSR, as well trade with Mongolia.

10. The railway network also serves Kashgar in western XUAR. This is located about 165 km by road from the border with Kyrgyz Republic at Torugart

³ With direct port–rail transfer now being emphasized in terminal design, the share of containerized sea cargo moving by rail should increase significantly in future.

⁴ The CRC has been extending its network to additional border-crossing points with CAREC MCs, including at Bichigt/Zuun Khataavch on the border with Mongolia. It has also been enhancing its railway coverage in XUAR and IMAR which will facilitate future rail connections with CAREC MCs.

Figure 1.1: PRC Railway Map, 2018

Note: the boundaries, colors, denominations, and any other information shown on this map do not imply, on the part of ADB, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information.

Source: ADB, TA consultants.

and 230 km from the border at Irkeshtam (providing onward access to Tajikistan and Afghanistan), and 412 km from the Khunjerab Pass providing access to Pakistan. Kashgar is an important commercial hub of western XUAR that was once an important stop on the ancient Silk Road. It is the transport and logistics

center for the PRC's trade with Kyrgyz Republic, Tajikistan and Pakistan. Since the railway terminates at Kashgar, onward transport to these countries relies on road transport which is challenging due to the mountainous terrain.⁵

⁵ Other CAREC MCs that use Russian gauge are Azerbaijan, Georgia, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan.

11. The railway gateways in Kazakhstan, Mongolia and the Russian Federation involve a change of gauge since these countries use Russian gauge (1,520 mm) while the PRC uses standard gauge (1,435 mm).⁶ Facilities for transloading are therefore provided at the gateway.

12. The two major east-west railway lines connecting the PRC with countries to the west and north are (i) the Longhai/Lanxin lines linking Lianyungang, Lanzhou and Urumqi in XUAR (3,652 km) which connects with the Alashankou and Khorgos gateways, and (ii) the Jingbao line between Beijing and Baotou in IMAR (833 km) which connects with the Erenhot gateway. The Longhai/Lanxin lines are double tracked and electrified well beyond Urumqi in the direction of Alashankou and Khorgos. The Jingbao line is also double tracked and electrified almost all the way to Erenhot.

C. Institutional responsibilities for railways

13. The development and operation of the PRC railway system was for many years the responsibility of the Ministry of Railway (MOR). In 2013, MOR's regulatory functions were transferred to the newly-formed National Railway Administration (NRA) within the Ministry of Transport (MOT). MOR's railway operations functions were reorganized as the China Railway Corporation (CRC), a state-owned enterprise with CNY1.74 trillion in registered capital. CRC's responsibilities include railway construction, operation, control and safety, allocation of network capacity and other public obligations as specified by national regulations. This reorganization was designed to promote law-based, market-oriented operations and to foster innovation.

14. Since the government is the sole shareholder, the Ministry of Finance (MOF) oversees CRC on behalf of the State Council. Due to the importance of CRC, its general manager holds the rank of a full minister. The general manager reports directly to the Premier and participates in the Premier's meetings as a peer to the Minister of Transport. Since the 2013 reform, CRC has enjoyed a significant degree of autonomy with only limited influence from the NRA.

15. CRC has 18 regional railway administrations (frequently called railway bureaus) that are responsible for day-to-day operation and management of railway lines and facilities within their respective geographic jurisdictions. The regional railway administrations are located in Beijing, Chengdu, Guangzhou, Hohhot, Harbin, Jinan, Kunming, Lanzhou, Nanchang, Nanning, Qingzang, Shanghai, Shenyang, Taiyuan, Urumqi, Wuhan, Xi'an and Zhengzhou. With respect to the PRC regions that are part of CAREC, railways in Xinjiang fall under the Urumqi regional railway administration while responsibility for railways in Inner Mongolia is shared among the Harbin, Hohhot, Lanzhou and Shenyang regional railway administrations.

16. Since its founding, CRC has operated as a state-sanctioned monopoly. However, the central government wishes to attract private sector investment in the rail sector, and is considering opening up the CRC rail network to various forms of vertical separation to attract rail sector investors. One of the main reasons for opening up the network is that large sums are required for railway investment but CRC has been experiencing financial difficulties (Chapter 4).

17. CRC's previous experiments of forming joint ventures with private investors were not very successful.⁷ However, CRC is now willing to consider

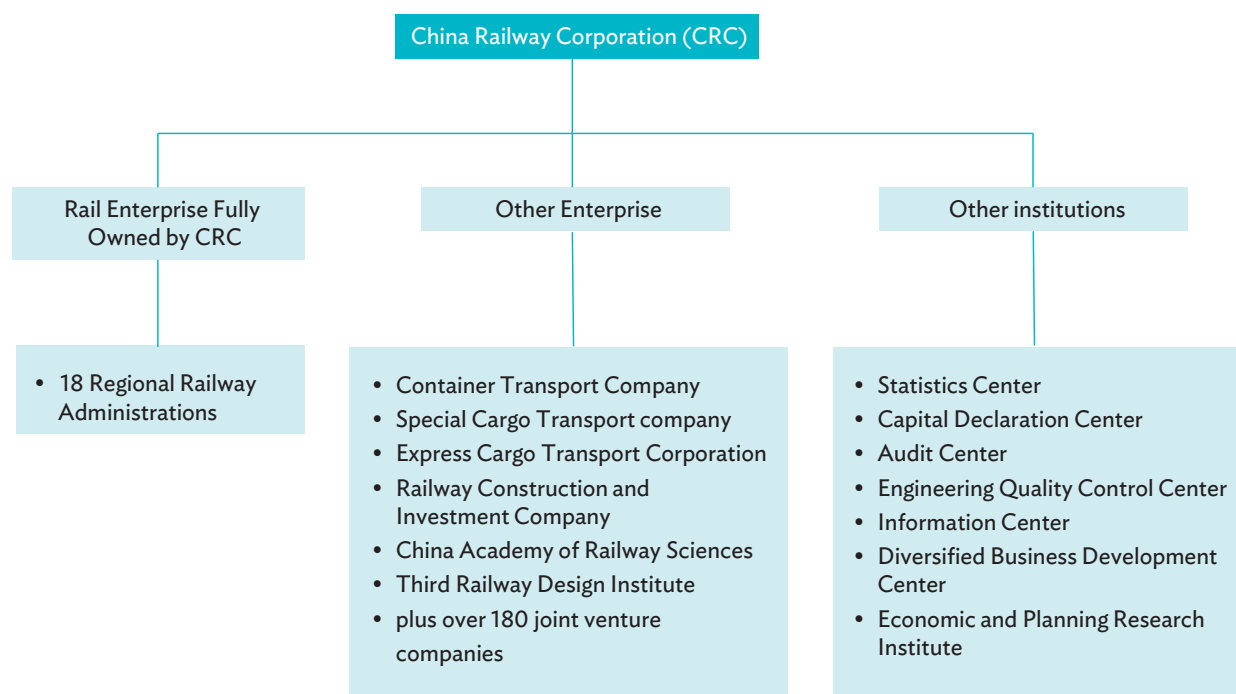
⁶ The vertical separation model involves one company building and maintaining the railway tracks while other companies run the day-to-day train operations, paying a track access charge determined by a regulator. The UK's railways have used this model since the 1990s.

⁷ Loss making private investments include the China Rail Container Transport Corporation (CRCTC) joint venture with Deutsche Bahn, CMA CGM, Zim and various Hong Kong investors.

allowing outside companies to run trains over its lines and leasing of locomotives and wagons to outside operators. It is also partnering with logistics companies, parcel express companies and freight forwarders to develop new services. For example, SF Express, a leading PRC parcel express company, is currently using CRC's HSR trains for linehaul between major cities. Looking ahead, more partnerships between CRC and private operators will likely develop, with each contributing complementary networks, equipment, skills and customer relationships. CRC's current organization chart is shown in Figure 1.2. This indicates that CRC already has many a fairly joint ventures with private enterprises.

18. Even though vertical separation is still a work-in-progress, there has been horizontal competition⁸ from the Shenhua Railway Company since 2006. In 2017, it controlled and operated approximately 2,200 km of railway line.⁹ It is a part of Shenhua Energy, a large coal mining and electricity supply company. Shenhua's success may be attributed to (i) Shenhua Energy provides an assured source of cargo from its own mines; (ii) a well-integrated transport system, including direct rail link to ports and vessels owned by Shenhua Energy; and (iii) a separately owned and operated railway network free from CRC control. While there currently no other competitors to CRC, additional market entrants are likely in the future. NRA has already issued a document to allow newcomers to enter the rail transport market for both freight and passenger transport.

Figure 1.2: China Railway Corporation Organization Chart



Source: Prof. Jianhong Wu, Beijing Jiaotong University

⁸ Under horizontal separation, each company manages its own infrastructure and day-to-day operations, and competes with other companies based on its own network. This is comparable to the rail system in USA.

⁹ Shenhua's Shenshuo–Shuohuang line is a major coal transport railway from western to eastern PRC. Its rail network also serves outside customers that ship coal and mineral ores.

D. Cross-border and transit traffic routes

19. To support the rapid growth of its international trade, the PRC has given careful attention to the development of ports, ocean shipping, land transport and border crossing facilities. This has included improving its road and rail connections and border crossings with neighboring countries and, through the Belt and Road Initiative, developing long distance international transport corridors linking Asia with Europe, the Middle East and other parts of the world.

20. Most of the PRC's trade is transported by ocean shipping which is significantly less costly than other modes. However, land transport is used when traffic origins or destinations are difficult to access by

sea (e.g. PRC inland cities) or when shorter delivery time is needed. In view of the very long travel distances involved, efficient railway transport has potential to be more competitive than road transport as long as reasonable speeds are maintained and delays and additional costs for border crossing, gauge change and intermodal transfers are minimized. The most effective way of realizing this potential is through use of container block trains supported by close coordination arrangements with the other railways on route.

21. The PRC uses four main international railway corridors for its trade with countries to the west. These are the Trans-Siberian Railway (TSR), the Northern Trans-Asian Railway, the Trans-Caspian International Transport Route (TITR) and various other routes referred to as the southern corridor. This is shown in Figure 1.3.

Figure 1.3: Regional Rail Links and Ports Serving Cross-border and Transit Traffic



Notes: (1) within the PRC the map covers principal railway trunk routes used for trade between the PRC and CAREC member countries and regional railway links relevant for Inner Mongolia and Xinjiang, the two PRC regions that participate in CAREC; (2) the boundaries, colors, denominations, and any other information shown on this map do not imply, on the part of ADB, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information.

Source: TA consultants.

22. Trans-Siberian Railway (TSR). This is currently the busiest corridor. It connects with the PRC at Manzhouli or Erenhot and is therefore convenient for traffic to and from northern and eastern parts of the PRC. The corridor serves trade with the Russian Federation and Europe, and also provides connections via Kazakhstan to CAREC MCs. Although the travel distance is longer than other corridors, the TSR has the significant advantages that most of the journey is conducted in a single country (Russian Federation) and onward travel through Belarus remains within a common customs area—the Eurasian Economic Union (EEU)—so border delays and costs are minimized and no further gauge change is needed until arrival in Europe.

23. Northern Trans-Asian Railway. This corridor provides a further option for traffic to and from southern and western parts of the PRC to access the TSR. Extending from eastern to western PRC, it enters Kazakhstan and connects through the KTZ network into the TSR.

24. Trans-Caspian International Transport Route (TITR). This is the most suitable corridor for traffic to much of Central Asia and to Iran and the Middle East. It is being developed as a multimodal corridor to reach Southern Europe after crossing the Caspian and Black Seas. For Central Asian countries it generally offers the shortest distance routes for trade with Kazakhstan, Uzbekistan, Tajikistan, Kyrgyz Republic, Turkmenistan, Azerbaijan and Georgia. It also offers onward connections to northern Afghanistan.¹⁰ However, for longer distance traffic the corridor has the disadvantages of crossing multiple borders and railway administrations, and requires transfers to and from ferries, so its longer

term potential depends on all the countries on route establishing effective arrangements for efficient corridor coordination and management.¹¹ An alternative to the TITR is the Lapis Lazuli Corridor which passes through Uzbekistan and Turkmenistan, crossing the Caspian Sea at Turkmenbashi.

25. Southern corridor. This corridor encompasses several existing and proposed routes southwest from the PRC to Uzbekistan, Kyrgyz Republic, Tajikistan, Afghanistan, Pakistan, Turkmenistan, Iran, Turkey and the Middle East. The main existing railway route is via Kazakhstan to Uzbekistan, Turkmenistan, Iran and countries further west. Several alternative routes from Kashgar have been proposed. These include (i) the proposed PRC–Kyrgyz Republic–Uzbekistan Railway via the Fergana Valley, (ii) a proposed link to Dushanbe (Tajikistan) via Sary-Tash (Kyrgyz Republic) and Karamyk (Tajikistan), (iii) a proposed link directly to northern Afghanistan via Wakhan and Kunduz, and (iv) directly connecting to Pakistan on the proposed China–Pakistan Economic Corridor (CPEC). Each of these links would be very costly to construct due to mountainous terrain. Route (iii) would be contingent on construction of railway network crossing from eastern to western Afghanistan, while Route (iv) would require rehabilitation of much of Pakistan’s railway network.

26. The majority of PRC–Europe and PRC–Russian Federation express container block trains currently use the TSR with gauge change at Manzhouli or Erenhot. The other main route used is the TITR. Traffic volumes on the TITR are much lower but expected to increase in future when corridor coordination and management improve.

¹⁰ The Afghanistan railway terminates at Mazar-e-Sharif beyond which freight must transfer to road transport.

¹¹ The TITR is sometimes referred to as the Middle Corridor. The members of the TITR Association comprise Azerbaijan Caspian Shipping, Azerbaijan Railways, Aktau Port, Baku Port, Georgian Railways, Kazakh Railways, Turkish Railways and Ukraine Railways. Associate members include the Polish Broad Gauge Railway, Batumi Port, Kaskor-Transservice (Kazakhstan), Port Kuryk (Kazakhstan), Anaklia Development Consortium, Lianyungang Port Holdings Group (PRC), Grampet Group (Romania), Astyk Trans (Kazakhstan), Kazakh National Maritime Shipping Company, and Eastcomtrans (Kazakhstan).

27. The selection of railway corridor is not based on geography alone. Other important considerations are tariff rates of interline railways,¹² the throughput capacity of interchange gateways, speed, transit time variance, desire to foster competition between routes, and avoidance of over-reliance on one route are other considerations. An additional factor is that, in order to increase the attractiveness of container block train services on the TSR and TITR, both the Russian Federation and the PRC have been offering tariff subsidies and discounts, although it remains to be seen how long these will continue.

28. The principal segments of the international freight market relevant for CRC over the medium and long term are summarized as follows:

- (i) **Between Russian Federation and northern Europe.** Assuming no major shift in the relative tariffs applicable on the different corridors, traffic to and from northern PRC is likely to use the TSR, while traffic to and from central and western PRC will use either the Northern Trans-Asian Railway connecting to the TSR or the TITR if corridor performance is improved (particularly journey duration, reliability and predictability and competitiveness of pricing).
- (ii) **Between southern Europe, the Mediterranean and the Caucasus.** If corridor performance is improved, the TITR could have significant market potential and the role of the Lapis-Lazuli corridor could be expanded. These routes will also face competition from the Northern Trans-Asian Railway and from road transport.

- (iii) **Between Kazakhstan.** This segment, focusing primarily on Kazakhstan, could see intense competition, since it can be conveniently accessed using the TSR, the Northern Trans-Asian Railway and the TITR, and is also near enough to the PRC for road transport to compete for traffic.
- (iv) **Between Uzbekistan, Kyrgyz Republic, Tajikistan, Turkmenistan and Afghanistan.** Assuming that present economic reforms are sustained in Uzbekistan, Central Asia's most populous country, there is potential for it and its neighbors to achieve a rapid expansion in trade volumes and increased containerization that will improve the competitiveness of railways. The TITR would have potential to attract a substantial market share but corridor performance would need to improve in the face of strong competition from road transport. The TITR's competitiveness could be enhanced if the proposed PRC–Kyrgyz Republic–Uzbekistan railway from Kashgar to the Fergana Valley (Figure 1.3) is built, leading to reduced travel distances and journey times for some traffic. The other proposed southern routes (para. 25) would significantly reduce travel distances to countries further south. However, due to high costs, limited traffic and existing network limitations, it is uncertain which, if any, of these routes will be built.
- (v) **Between Iran and the Middle East.** When present international sanctions on Iran come to an end, there may be increased potential for the southern routes, although railway will also face strong competition from ocean shipping.

¹² According to CCTA, RZD has the lowest charges for container block trains. It charges \$0.35–0.5 per container-km for block trains, compared with \$0.5–0.55 using KTZ and Belarus Railway, 1 Euro using European railways, and \$0.55–0.60 using CRC after 30% tariff discount.

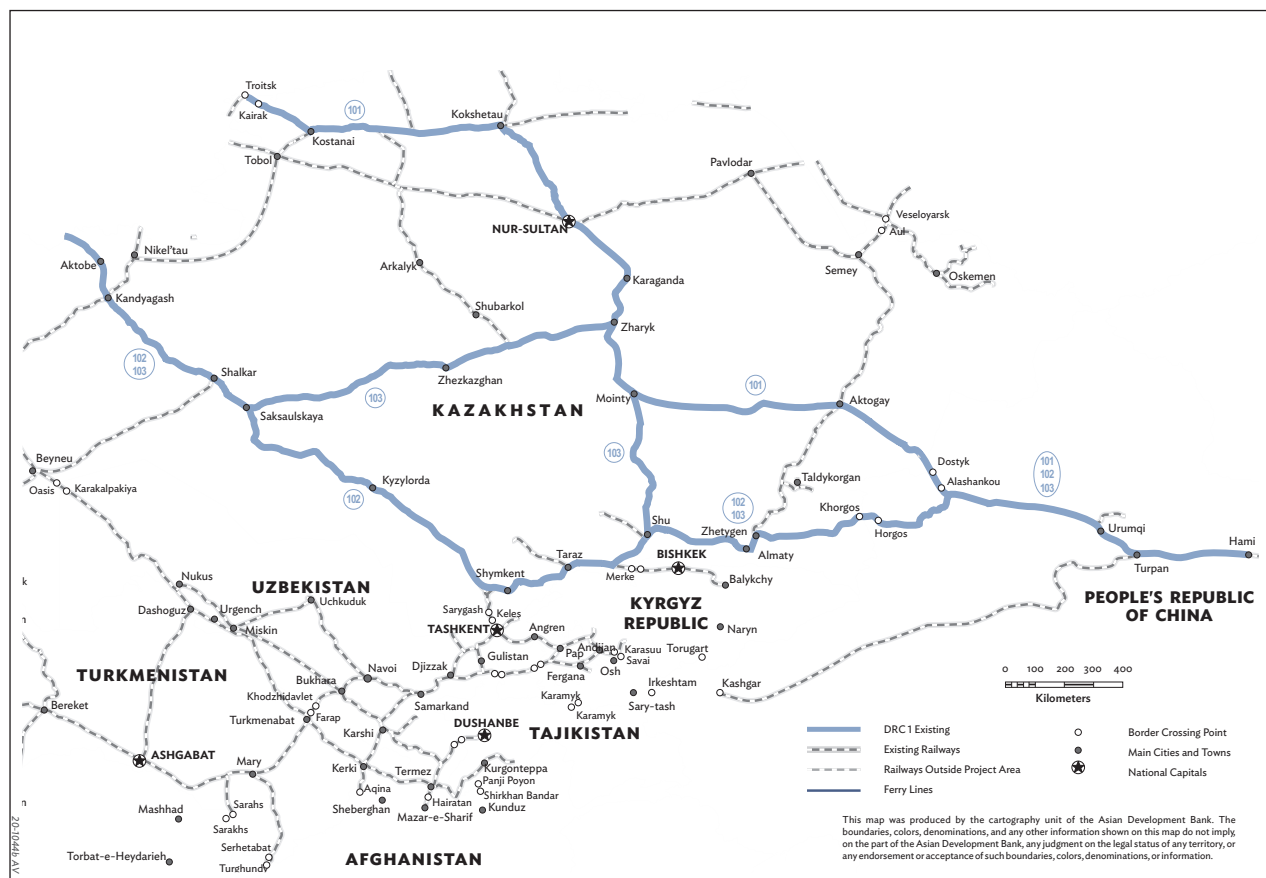
E. Relevant CAREC corridors

29. The PRC is the origin and destination of several Central Asia Regional Economic Cooperation (CAREC) corridors. Those that are most relevant are Corridors 1, 2 and 4. CRC is the only rail operator on these corridors within the PRC.

30. **CAREC Corridor 1: Europe–East Asia.**
Corridor 1 links the PRC with Europe, passing through

Kazakhstan, Russian Federation and Belarus to reach Poland, Germany and the Netherlands. Within the PRC, Corridor 1 extends from Lianyungang Port, on the PRC's east coast, via Zhengzhou, Xi'an, Lanzhou and Urumqi to connect with the Kazakhstan border at Alashankou/Dostyk or Khorgos/Altynkol. Gauge change is required at the border, with cargo transloaded between CRC and KTZ wagons.¹³ Beyond the PRC, three subcorridors traverse different routes within the Kazakhstan railway network to connect with the Russian Federation. Corridor 1 is shown in Figure 1.4.

Figure 1.4: Sections of CAREC Corridor 1 Relevant for the PRC



Source: CAREC Secretariat.

¹³ Transloading is much easier for containerized cargo than for cargo in wagons.

31. Subcorridor 101 is the most northerly route through Kazakhstan and is similar to the Northern Trans-Asian Railway in Figure 1.3. It extends through Hami, Urumqi, Alashankou, Dostyk, Aktogay, Nur Sultan and Troitsk. This is an important route carrying a large volume of traffic. Much of this subcorridor overlaps with routes of the Trans-Asian Railway and Corridors 2 and 5 of the Organisation for Co-operation between Railways (OSJD).

32. Subcorridor 101 was a major route during the Soviet era and continues to attract high traffic levels including container block trains. A recent study by the International Transport Forum (ITF) confirmed that Subcorridor 101 has the highest road and rail traffic levels among subcorridors of Corridor 1 (ITF 2019).

33. Subcorridor 102 is the most southerly route through Kazakhstan. It extends through Hami, Urumqi, Khorgos, Altynkol, Almaty, Shymkent, Kyzylorda, Shalkar and Aktobe. In relation to Figure 1.3, from Hami to Shalkar corresponds with the TITR and from Shalkar to Aktobe and onward to the Russian Federation it follows the Northern Trans-Asian Railway. This subcorridor utilizes the Khorgos–Altynkol border. Utilization of this corridor has increased as it is shorter and cheaper to ship from the PRC to Almaty and Central Asian countries. Some PRC–Europe express container trains now use the subcorridor. Traffic is growing as more PRC traffic is now using the Khorgos–Altynkol gateway following recent improvements.

34. Subcorridor 103 is similar to subcorridor 102 except that it follows a more northerly route for the Shu to Saksaulskaya section including the Zhezkazghan–Saksaulskaya section completed in 2014. Utilization is expected to grow in future.

35. Given the increased volume of trade between the PRC and both Europe and Central Asia, Corridor 1 is likely to play an important role in future transportation.

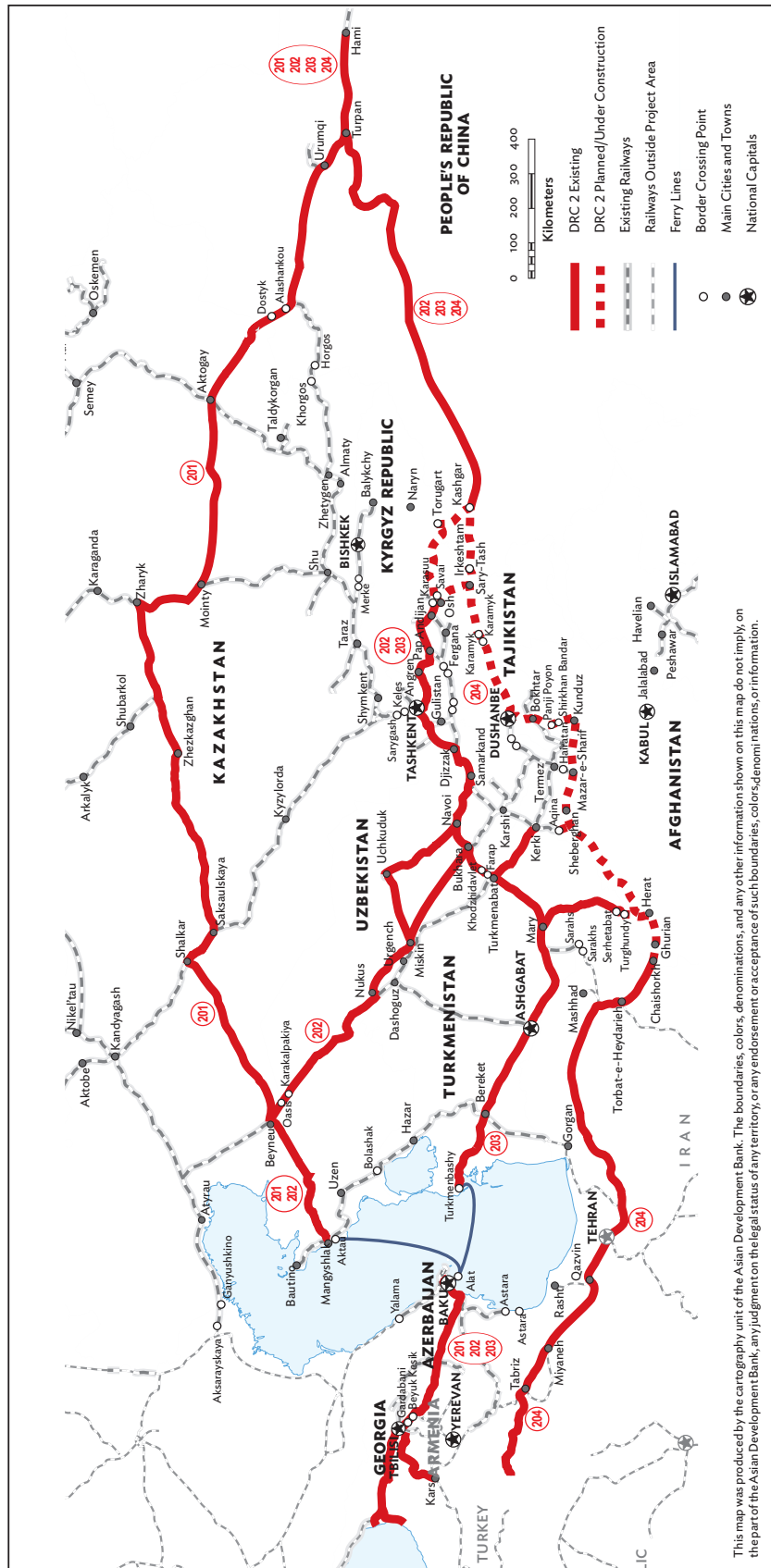
36. CAREC Corridor 2: Mediterranean–East Asia. Corridor 2 runs east-west connecting East Asia with Central Asia, the Caucasus and the Mediterranean littoral states. Between the PRC in the east and Georgia in the west, this corridor passes through all CAREC MCs except Mongolia and Pakistan. Beyond the PRC, four subcorridors traverse different routes through Central Asia and the Caucasus. Corridor 2 is shown in Figure 1.5.

37. Within the PRC, Corridor 2 extends from Lianyungang Port via Zhengzhou, Xi'an, Lanzhou and Turpan and then forks either northwest to Urumqi to reach the Kazakhstan border at Khorgos/Altynkol where gauge change is required (para. 30), or southwest via the Southern Xinjiang Railway to Kashgar where the railway terminates and onward travel is by road transport entering the Kyrgyz Republic either at Torugart or Irkeshtam.

38. Currently, there is only limited cross-border traffic on Corridor 2, although there is potential for traffic to grow if corridor performance is improved. Current disadvantages of the corridor include (i) an additional modal change is needed to traverse the Caspian Sea,¹⁴ (ii) multiple border crossings are required, and (iii) there are missing links, particularly in Kyrgyz Republic, Tajikistan and Afghanistan. A notable missing link is the lack of a rail connection between the PRC and Uzbekistan via Kyrgyz Republic. Uzbekistan is the most populous country in Central Asia, its trade with the PRC is growing rapidly, and its railway network offers efficient onward connections with Tajikistan, Turkmenistan, Afghanistan and Iran.

¹⁴ Caspian Sea transit introduces significant complexity, uncertainty and port delays. Ship schedules are not synchronized with train schedules. Weather problems occur frequently, especially during winter. Port handling charges add to the cost of transport.

Figure 1.5: Sections of CAREC Corridor 2 Relevant for the PRC



Source: CAREC Secretariat.

39. Subcorridor 201 connects the PRC with the Caucasus through Kazakhstan and the Caspian Sea. It extends via Hami, Urumqi, Alashankou, Dostyk, Mointy, Zharyk, Saksaulskaya, Beyneu, Port Aktau, through the Caspian Sea to Baku, Gardabani, Tbilisi, and enters Turkey at Kars. The subcorridor is similar to the northern section of the TITR in Figure 1.3, and also overlaps with Trans-Caucasus Route developed by Transport Corridor Europe–Caucasus–Asia (TRACECA). The NRA supports the development of this subcorridor and considers that CAREC should play an active role in its development due to the complexity of rail/sea coordination and the larger number of players involved in rate and schedule coordination (footnote 12).

40. The other three subcorridors are further to the south and are not well-developed due to missing links west of Kashgar. Existing PRC traffic on these subcorridors is very small. Subcorridors 202 and 203 are the same between the PRC and Navoi in Uzbekistan and to the west of Baku after crossing the Caspian Sea. West of Navoi, Subcorridor 202 proceeds through Uzbekistan and Kazakhstan to cross the Caspian Sea at Aktau port, while Subcorridor 203 routes through Turkmenistan to cross the Caspian Sea at Turkmenbashi port. In the case of Subcorridor 204, there are large sections of missing links in Tajikistan and northern

Afghanistan, so prospects for development may be considered longer term (Table 1.1).

41. **CAREC Corridor 4: Russian Federation–East Asia.** This corridor connects the Russian Federation with the PRC via Mongolia. Currently, only Subcorridor 401 is complete. It extends from the Russian Railway (RZD) at Naushki on the Russian Federation–Mongolia border to meet the CRC railway network at Zamiin-Uud/Erenhot on the Mongolia–PRC border. The corridor is 1,010 km long, single-tracked and non-electrified. Railway services are provided by UBTZ which is 50% owned by the Mongolian government and 50% by RZD. The corridor has long been a busy route for transit traffic between the PRC and the Russian Federation. The main traffic imported by the PRC comprises lumber and bulk materials. The main PRC export traffic is consumer merchandise, building materials and equipment. Containerized traffic has grown from 8 container block trains in 2014 to 857 container block trains in 2018 (equivalent to 14% of the total of 6,300 block trains organized by the PRC in 2018). Corridor 4 is shown in Figure 1.6.

42. Gauge change is required at the PRC–Mongolia border. In the past this was a cause of major delays. With ADB support, a modern multimodal terminal was completed at Zamiin-Uud in 2019. This has alleviated transloading delays.

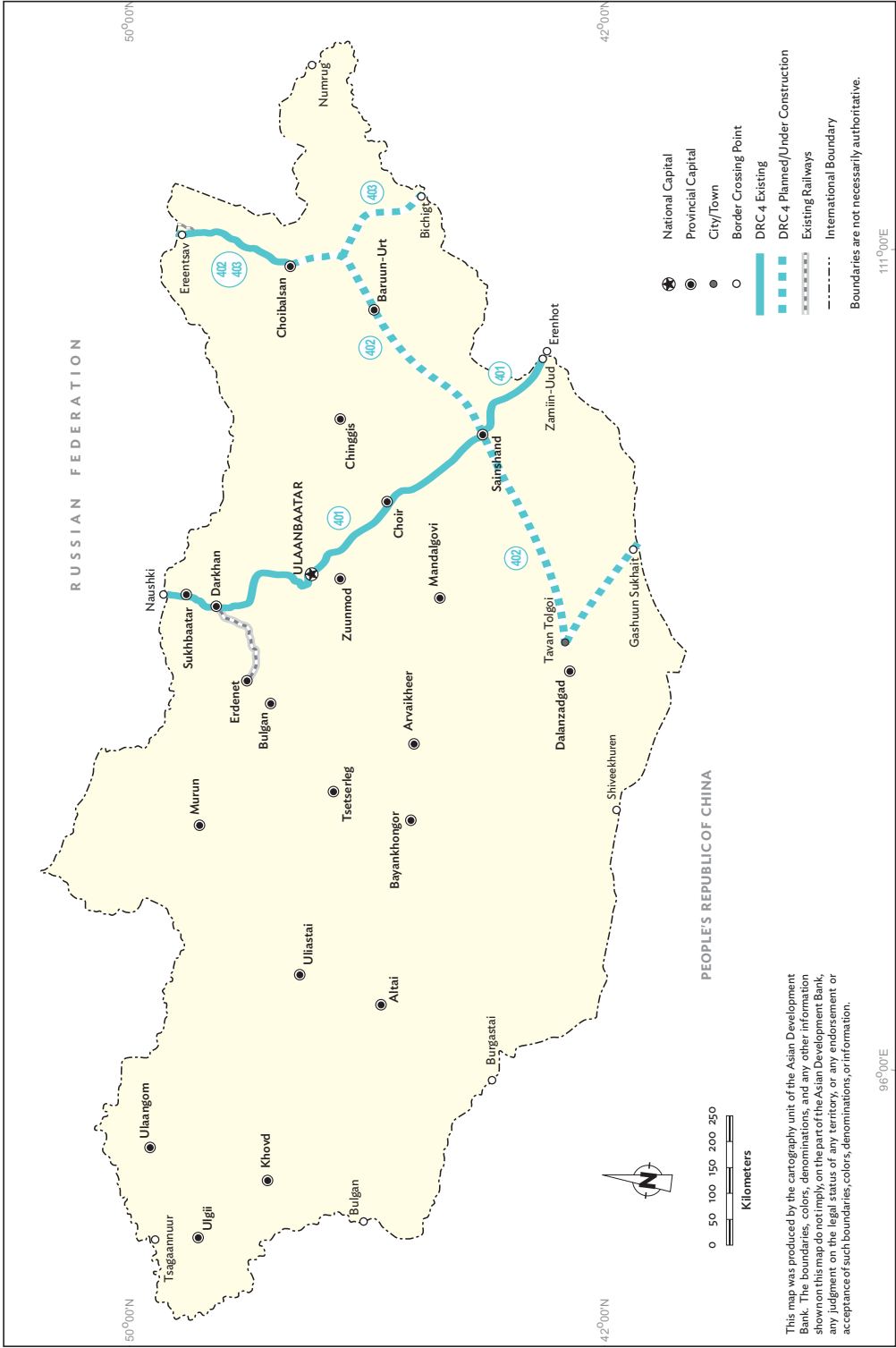
Table 1.1: Subcorridors of CAREC Corridor 2

Corridor	Countries	Modalities	Caspian Sea Ports
201	Azerbaijan, PRC, Georgia, Kazakhstan	Rail/Sea	Aktau–Baku
202	Azerbaijan, PRC, Georgia, Kazakhstan, Kyrgyz Republic, Uzbekistan	Rail/Sea	Aktau–Baku
203	Azerbaijan, PRC, Georgia, Kyrgyz Republic, Uzbekistan, Turkmenistan	Rail/Sea	Turkmenbashi–Baku
204	Afghanistan, PRC, Iran, Kyrgyz Republic, Tajikistan	Rail	–

CAREC= Central Asia Regional Economic Cooperation.

Source: TA consultants.

Figure 1.6: Sections of CAREC Corridor 4 Relevant for the PRC



43. Historically, railway was the dominant mode on this corridor. Following ADB-financed paving of the missing sections of highway, a substantial amount of cargo is now moving by road.

44. Although Subcorridor 401 offers a shorter route to the TSR than via Manzhouli, most PRC traffic using the TSR routes via Manzhouli. This is because: (i) the UBTZ railway faces capacity limitations, (ii) two additional border crossings are needed and these add to journey time and cost, (iii) dealing with an additional railway increases complexity, (iv) RZD offers more attractive rates to maximize usage of the TSR, and (v) speeds on UBTZ are slower due to the age and condition of the track and rolling stock. However, as the Manzhouli rail gateway reaches full capacity, this may lead to more block trains using the UBTZ railway assuming that UBTZ proceeds with adding a second track and electrifying the railway. Recent news from Mongolia indicates both Russian Federation and Mongolian government will likely undertake this investment in the near future.

45. **CAREC Corridor 5: East Asia–Middle East and South Asia—Subcorridor 503.** This corridor connects the PRC with Pakistan via Kyrgyz Republic, Tajikistan and Afghanistan. To the south,

it provides access to Pakistan's deep sea ports of Karachi and Gwadar. To the north, it provides access to the PRC. Subcorridor 501 proceeds directly from Kashgar to Pakistan. Within Pakistan it extends through Islamabad and Lahore to Karachi. Much of the subcorridor is similar to the proposed CPEC that Pakistan and the PRC have been considering to rehabilitate Pakistan's main railway line. The northern section between Kashgar and Havelian (Pakistan) passes through mountainous terrain and would be very costly to construct. Subcorridor 502 provides a direct link within Pakistan from near Peshawar to Gwadar port. Most of this subcorridor has yet to be built. Subcorridor 503 extends Corridor 5 westwards to Kyrgyz Republic, Tajikistan, Afghanistan, and Gwadar port. It also connects to Karachi via Subcorridor 501. None of Subcorridor 503 has yet been built. Corridor 5 is shown in Figure 1.7.

46. Corridor 5 is strategically important as it would connect the PRC and landlocked countries on the route with Pakistan, providing efficient rail access to its ports. It could also provide onward connections through Pakistan to India. However, a long time frame may be needed before this corridor can be built as construction costs would be very high due to the mountainous terrain.

Figure 1.7: Sections of CAREC Corridor 5 Relevant for the PRC



Source: CAREC Secretariat.

TRENDS IN RAILWAY TRAFFIC

A. Introduction

47. Historically, railway was the PRC's leading transport mode and played a key role in the centrally planned economy, particularly through long distance transportation of coal and other raw materials required by industry. This was partly as a result of underdevelopment of the road network. Over the past three decades, alongside gradual liberalization of the economy, the government invested enormously in development of high-quality road, railway and inland waterway transport networks. This alleviated many of the previous infrastructure capacity bottlenecks, allowing the transport modes to compete for traffic on the basis of price and quality. This led to a significant reduction in the dominance of railways.

48. As Table 2.1 indicates, between 1990 and 2018, although railway freight volume (tons) and turnover (ton-km) both increased steadily, the railway share of total freight volume reduced from 16% to 8% and its share of freight turnover reduced from 41% to 14%. While the road transport share of total freight volume remained fairly constant, its share of total freight turnover increased from 13% to 35%, reflecting the increase in long distance road transport made possible by development of the expressway network. In the case of inland waterway transport, which competes with railways for bulk and break-bulk cargo, the share of total freight volume increased from 8% to 14%, while the share of total freight turnover increased from 44% to 48%.

Table 2.1: Trends in Freight Traffic by Mode, 1990–2018

	1990	1995	2000	2005	2017	2018
Freight volume (million tons)						
Railways	1,507	1,660	1,786	2,693	3,689	4,026
Highways	7,240	9,404	10,388	13,418	36,869	39,569
Waterways	801	1,132	1,224	2,196	6,678	7,027
Other modes	158	154	189	313	813	905
Total	9,706	12,349	13,587	18,621	48,049	51,527
Freight turnover (billion ton-kilometers)						
Railways	1,062	1,305	1,377	2,073	2,696	2,882
Highways	336	470	613	869	6,677	7,125
Waterways	1,159	1,755	2,373	4,967	9,861	9,905
Other	64	61	69	117	503	556
Total	2,621	3,591	4,432	8,026	19,737	20,469

continued on next page

Table 2.1 continued

	1990	1995	2000	2005	2017	2018
Share of freight volume (%)						
Railways	16	13	13	14	8	8
Highways	75	76	76	72	77	77
Waterways	8	9	9	12	14	14
Other	2	1	1	2	2	2
Share of freight turnover (%)						
Railways	41	36	31	26	14	14
Highways	13	13	14	11	34	35
Waterways	44	49	54	62	50	48
Other	2	2	2	1	3	3

Source: National Bureau of Statistics of China 2019b.

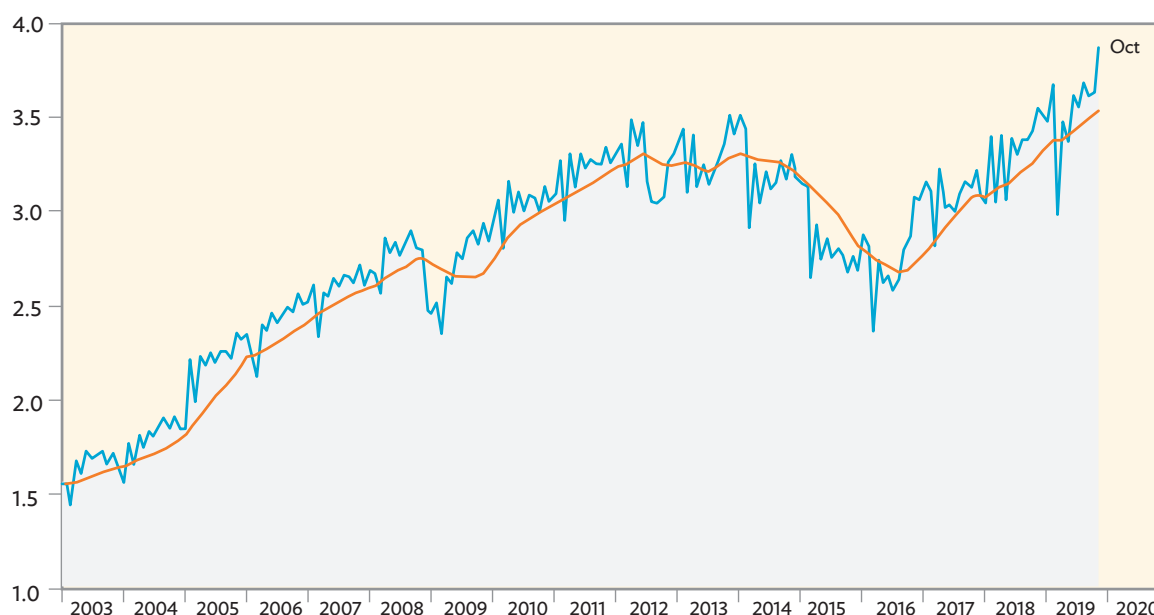
49. As a result of these changes, the CRC is now operating in a more challenging transport market that requires it to offer competitive prices and improve service quality, timeliness and reliability. In the face of increased competition, railway traffic plateaued from 2010 to 2013, and declined from 2014 to 2016. Since 2017, growth in railway has resumed growth (Figure 2.1).

B. Analysis of traffic

1. National trends in cross-border railway traffic

50. CRC's total freight volume has grown slowly over past five years (with a substantial dip in 2015 and 2016 due to diversion to road transport after

Figure 2.1: Rail Freight Tonnage Trend, 2013–2019 (billion tons)



Notes: (1) data is for January 2013 to October 2019, (2) red line shows 12-month moving average.

Source: Yardeni Research. 2019. Global Economic Indicators: China Railways Traffic (based on China National Bureau of Statistics).

CRC raised tariffs). Freight traffic is predominantly domestic. In 2016 and 2017 the domestic share of total freight volume was about 99%, with cross-border freight amounting to only 1%.

51. As Table 2.2. shows, the PRC's total cross-border railway traffic declined from 47 million tons in 2013 to 29 million tons in 2015 before recovering to 39 million tons in 2017. Analysis by commodity type confirms that timber and metal ore products are leading import commodities. These are generally transported in wagons. Table 2.2 also shows a dramatic reduction in crude oil traffic, which used

to be imported in tank wagons but now uses pipelines.¹⁵

2. Trends in IMAR and XUAR cross-border railway traffic

52. In IMAR and XUAR, the two designated PRC regions that participate in CAREC, there has been steady growth in railway freight traffic (Table 2.3). Notably, during 2013–2017 IMAR rail container tonnage grew at an average annual rate of 63%. There was also a decline in passenger traffic by road. Over the same period, XUAR road passenger turnover

Table 2.2: Cross-border Railway Traffic by Commodity, 2013–2017

Commodity Type	Annual Traffic (ton '000)					Annual Growth (%)				
	2013	2014	2015	2016	2017	2013–2014	2014–2015	2015–2016	2016–2017	2013–2017 Average
Coal	7,040	3,030	800	1,010	5,760	-57	-74	26	470	-4
Petroleum	1,150	960	350	200	320	-17	-64	-43	60	-23
Coke	240	70	140	300	480	-71	100	114	60	15
Metal ore	20,160	14,518	10,210	12,030	11,582	-28	-30	18	-4	-10
Steel and non-ferrous metals	2,900	2,340	1,740	1,890	1,700	-19	-26	9	-10	-10
Non-metallic ore	330	310	270	290	310	-6	-13	7	7	-1
Mineral building materials	1,120	930	600	500	580	-17	-35	-17	16	-12
Cement	80	40	110	-	-	-50	175	-100	0	0
Timber	11,700	13,200	13,180	15,380	16,600	13	0	17	8	7
Foodstuff	220	300	200	370	420	36	-33	85	14	14
Cotton	200	81	70	80	40	-59	-14	14	-50	-28
Chemical fertilizers and pesticides	2,000	1,370	1,330	1,420	980	-32	-3	7	-31	-13
Salt	20	10	10	820	10	-50	0	8,100	-99	-13
TOTAL	47,160	37,160	29,010	34,290	38,782	-21	-22	18	13	-5

Source: TA consultants, based on China Railway Yearbook, 2013–2017.

¹⁵ The reduction in recorded cross-border coal traffic from 2013 to 2015 was probably due to imported coal crossing the border into the PRC by truck and then being transloaded into CRC wagons at nearby railway stations (e.g. coal from Mongolia's Tavan Tolgoi mine crossed by truck at the Gashuun Sukhait border crossing, and was then transloaded into railway wagons at Gans Mod). The reduction in metal ore traffic was probably caused by changes in ore sourcing. For example, mineral ore from Australian and Brazilian mines can be shipped in coastal vessels from sea ports to steel plants located along the coast or the Yangtze River.

Table 2.3: Trends in XUAR and IMAR Traffic Statistics, 2013–2018

Traffic Type	2013	2014	2015	2016	2017	2018	Average Annual Growth, 2013–2018 (%)
Inner Mongolia Autonomous Region							
Rail freight traffic (million tons)	673	652	556	561	658	725	2
Rail freight turnover (billion tkm)	228	237	195	182	238	261	3
Rail container traffic (million tons)	3.5	3.4	3.3	4.1	25.6	..	63 ^a
Road freight traffic (million tons)	971	1,267	1,195	1,306	1,475	1,600	11
Road freight turnover (billion tkm)	187	210	224	242	276	299	10
Rail passenger traffic (million passenger trips)	46	48	51	54	54	54	3
Rail passenger turnover (billion pkm)	18.7	20.2	21.1	22.2	22.0	21.5	3
Road passenger traffic (million passenger trips)	162	135	110	103	94	78	-14
Road passenger turnover (billion pkm)	17	16	16	15	14	12	-7
Xinjiang Uighur Autonomous Region							
Rail freight traffic (million tons)	73	74	62	68	96	125	11
Rail freight turnover (billion tkm)	87	84	71	70	87	101	3
Rail container traffic (million tons)	7.1	6.6	4.3	3.8	5.0	..	-8 ^a
Road freight traffic (million tons)	596	648	645	651	748	850	7
Road freight turnover (billion tkm)	106	116	106	110	131	148	10
Rail passenger traffic (million passenger trips)	22.9	23.3	27.2	31.6	35.2	38.1	11
Rail passenger turnover (billion pkm)	22.5	22	22.8	24.5	27.1	28.3	5
Road passenger traffic (million passenger trips)	386	348	332	290	236	174	-14
Road passenger turnover (billion tkm)	32	28	25	21	16	12.3	-13

pkm = passenger-kilometer, tkm = ton-kilometer.

^a Average annual growth, 2013–2017.

Source: TA consultants, based on China Statistical Yearbooks, 2005–2019; China Railway Yearbook, 2013–2017; and Annual Yearbooks of XUAR and IMAR.

declined at an average annual rate of 13%. This may reflect shifts to other modes of travel. The very high railway freight volumes in IMAR are due to coal traffic from mines in IMAR to other parts of the PRC.

53. After years of government efforts to streamline trade and transport procedures and to promote trade along CAREC corridors, railway freight volume through the Alashankou, Khorgos and Erenhot cross-border

gateways is rising. Table 2.4 shows cross-border at these gateways, with Manzhouli included for reference purposes. Railway freight volumes at the three CAREC gateways greatly exceeded those by road—by a factor of 45 times at Alashankou, 3 times at Khorgos and 8 times at Erenhot. It is notable that railway traffic volumes through Alashankou recovered after the import of crude oil shifted from tank wagons to pipeline. From a 2015 low of 5.2 million tons, freight volume increased to

Table 2.4: Cross-border Freight Traffic by Rail Border Crossing Points, 2015–2018

Border Crossing Point	Annual Traffic (ton '000)				Annual Growth (%)			
	2015	2016	2017	2018	2015–2016	2016–2017	2017–2018	2015–2018 Average
Alashankou—rail	5,215	6,512	8,524	11,270	25	30	32	29
Alashankou—road	148	201	230	249	36	14	8	19
Khorgos—rail	917	567	1,629	2,707	-38	187	66	43
Khorgos—road	489	460	710	887	-6	54	25	22
Erenhot—rail	12,595	12,316	13,273	14,647	-2	8	10	5
Erenhot—road	3,239	2,041	1,758	1,914	-37	-14	9	-16
Manzhouli—road and rail	13,208	14,579	31,093	31,924	10	113	3	34

Source: TA consultants, based on China Ports Statistics and web page of Port Administration offices.

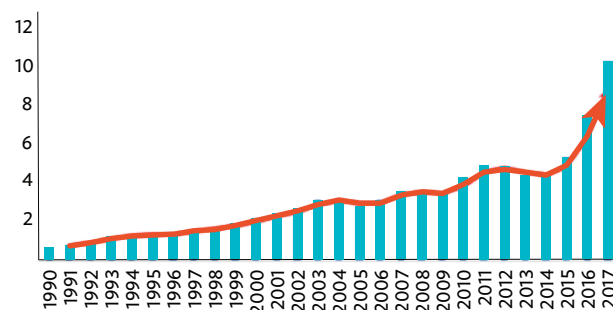
11.3 million tons in 2018. This was when growth in PRC–Europe and PRC–Central Asia container block trains took off. Similarly, freight volume through Khorgos also increased sharply from 0.9 million tons in 2015 to 2.7 million tons in 2018. Railway freight volume through Erenhot also increased from 12.6 million tons in 2015 to 14.6 million tons in 2018.

C. Containerization

1. Trends in rail containerization

54. The level of rail containerization of CRC traffic is much lower than for North American and European railways. Most commodities that use rail are still shipped in railway wagons. This includes coal, minerals, chemicals, construction materials, metal and grain.

55. However, as Figure 2.2 indicates, containerization is growing quickly. In 2017, CRC handled 10.3 million twenty-foot equivalents (TEU) of containers, an annual increase of 37%. For the past five years, the annual growth rate for container traffic has exceeded 20% each year. Container traffic accounted for 10.4% of CRC's total freight volume in

Figure 2.2: Annual China Railway Corporation Container Volume (million TEU)

Source: China Communication and Transport Association, Multimodal Transport Branch.

2017 but it is some way from the 20% target set by the government.

56. Containers are generally used for the transportation of high value cargo like consumer goods, processed food, equipment and automotive products. While much of the growth in containerization is likely to be in these cargo types, it is also possible that, in order to meet containerization target set by senior leaders (but not necessarily fulfilling the intent behind the growth target), CRC may be promoting the containerization of coal transport (Figure 2.3).

Figure 2.3: Coking Coal to be Loaded in China Railway Corporation Containers at Gans Mod Border Station, Inner Mongolia



Source: TA Consultants.

57. The most economic means of moving coal by rail is in large coal wagons designed to optimize loading/unloading of coal and hauling capacity. This is the predominant method used by Shenhua Railway Company for transporting coal and minerals within its network. Moving coal in containers involves hauling the dead weight of the container,¹⁶ which is often loaded onto CRC's high-sided rail wagons. Additionally, coal dust will damage and contaminate the container to the point that it cannot be used for transporting other types of cargo. No shipper will load electronics, garment, shoes, food, beverages or automotive parts into a container impregnated with coal powder.¹⁷ Consequently, most railways have banned the usage of their containers for moving coal. It may therefore be appropriate for CRC to re-evaluate its coal containerization initiative.

2. Containerization of cross-border railway traffic

58. Rapid growth in containerization for cross-border traffic is a bright spot for CRC. In 2018, for PRC-Europe express container trains, there were 3,610 outbound and 2,690 inbound trains, and for PRC-Central Asia container trains, the total number of outbound and inbound trains reached 3,373.¹⁹ This is shown in Table 2.5. PRC-Europe express container trains include trains between the PRC and Poland, Germany, Finland and Belarus. PRC-Central Asia trains include trains between the PRC and Kazakhstan and Uzbekistan.

¹⁶ The container weight plus platform wagon weight to coal payload weight ratio is much higher than the coal wagon weight to coal payload weight ratio.

¹⁷ Coal dust is also hazardous to the health of freight handlers during the loading/unloading process.

¹⁸ Cross-border e-commerce cargo makes up a significant part of these block trains. Alibaba, through its global retail arm AliExpress, has been among the most active companies expanding cross-border traffic.

Table 2.5: Trends in Rail Container Traffic, 2013–2018

Indicator	2013	2014	2015	2016	2017	2018
PRC systemwide container traffic						
Freight volume (million tons)	92.7	88.8	92.8	98.3	124.6	N/A
PRC-Europe express container trains						
Loaded containers—inbound (no. of trains)	0	28	265	572	1,274	2,690
Loaded containers—outbound (no. of trains)	80	280	550	1,130	2,399	3,610
Total	80	308	815	1,702	3,673	6,300

Source: TA consultants, based on “China Railway Express to Europe Trade Routes, 2019 Report.”

Table 2.6: Number of Block Trains by Interchange Gateway, 2018

2018	Alashankou	Khorgos	Erenhot	Manzhouli	Total
PRC–Europe	2,824	685	1,054	2,041	6,604 ^a
PRC–Central Asia	1,378	1,627	368	0	3,373
Total	3,702	2,312	1,422	2,041	9,477

^a CCTA's 2018 count of 6,604 PRC–Europe trains differs from NDRC's figure of 6,363 due to different data sources.

Source: CCTA.

59. Table 2.6 indicates the number of container block trains passing through each IMAR and XUAR interchange gateway in 2018. It is notable that (i) Alashankou is the most frequently used gateway for Europe, (ii) Manzhouli continues to be a leading gateway connecting the PRC with Europe, (iii) Khorgos is the most frequently used gateway for Central Asia, and (iv) the number of PRC–Central Asia trains is half the number of PRC–Europe trains, even though this service was introduced later and the Central Asia market is much smaller than the European market, and since the PRC's trade with Central Asia is likely to grow rapidly in coming years, there are prospects for significant further growth in container block trains to Central Asia.

60. A concern for policymakers is that much of the growth in use of container trains has been stimulated by large subsidies from local governments.¹⁹ Such subsidies have distorted the market, with some cities even shipping empty containers or containers loaded with valueless cargo to make up the 41 containers needed to qualify as a block train eligible for subsidy. Examples of the unintended consequences of this include (i) Urumqi forwarders moving traffic eastward to catch the Xi'an–Europe express container trains priced lower than Urumqi–Europe trains, and (ii) Nippon Express diverting seaborne cargo originating from Japan and Korea to Xi'an to exploit its heavily subsidized train Xian–Europe express container trains.²⁰

¹⁹ Some subsidies are nearly 40% of the transport rates.

²⁰ Since the objective of Xi'an's subsidies is to attract new industries to move to Xi'an—not to subsidize the logistics cost of Japanese and Korean manufacturers—this would seem to be a most inappropriate use of funds.

Figure 2.4: Monitoring of PRC–Europe Container Block Trains from Xi'an
(showing 420 container block trains shipped as of May 8 2019)



Source: TA Consultants.

61. For cities with established PRC–Europe express container trains (e.g. Chongqing), subsidies have been reduced and will be eliminated in the near future as train frequencies increase and outbound/inbound traffic approach balance. The National Development and Reform Commission (NDRC) is also aware of the misuse of subsidies and from 2020 is expected to switch its policy position from encouraging rapid growth to supporting sustainable, quality growth of container block trains. Recognizing that volume of PRC–Europe and PRC–Central Asia block trains has now reached critical mass and already helped to establish many new routes, MOF has mandated that by 2021 all train subsidies must end.

62. A concern of freight forwarders, shippers/receivers and government researchers is the emerging congestion at Erenhot/²¹Zamiin-Uud and Alashankou/Dostyk. According to CCTA, transloading capacity is already close to saturation at Erenhot and about 65% to 70% utilized at Alashankou/Dostyk.²² Given the rapid growth of PRC–Europe container trains (a 20-fold increase from 2014 to 2018) and PRC–Central Asia trains, it will not be long before transloading capacity is saturated. Therefore, transloading capacity will need to be increased soon—by investing in infrastructure expansion, equipment and work process improvement.

²¹ Forwarders have reported severe bottlenecks in Erenhot.

²² Transloading capacity at Manzhouli is also approaching saturation.

Figure 2.5: China Railway Corporation Intermodal Terminal



Source: TA Consultants.

MARKET COMPETITIVENESS

A. Introduction

63. Railway market competitiveness depends on several factors, notably (i) the quality of infrastructure, rolling stock and other assets, (ii) the quality and reliability of railway services as perceived by existing and potential customers, and (iii) the price of railway services.

B. Trends in market competitiveness

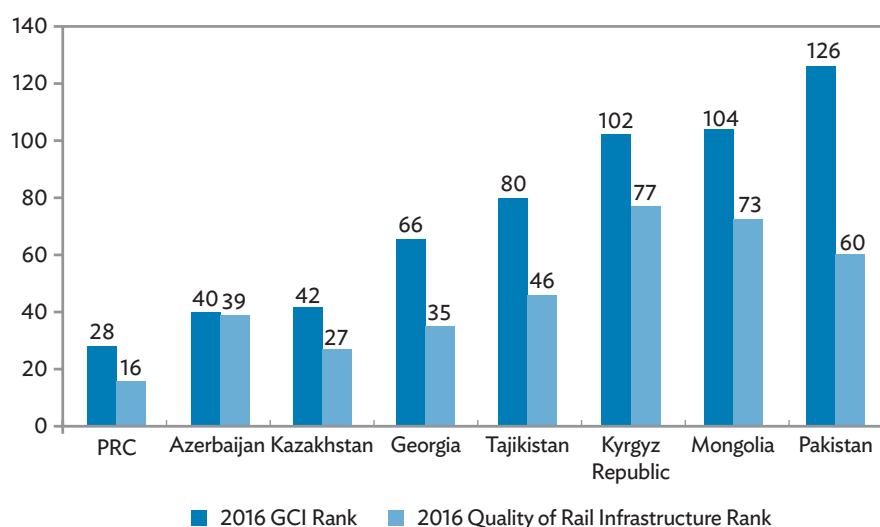
64. In the PRC, much of the railway network was built or upgraded within the last 2–3 decades. Consequently, unlike many other CAREC railways, the

infrastructure, rolling stock and other assets are relatively modern and incorporate more recent technological advances. According to the World Economic Forum (WEF), the quality of the PRC's railway infrastructure ranks highest among CAREC MCs (Figure 3.1).

65. Within the last decade, the PRC's freight market has changed from a supply constrained market to a balanced market. This is due to the expansion of the highway network, and growth in road transport and railway transport capacity. Inland waterway transport and coastal transport have also expanded significantly.

66. To assist CRC to compete in this new environment, NDRC on behalf of the State Council has significantly reduced railway tariff regulation.

Figure 3.1: Rail Infrastructure Quality Rankings of Selected CAREC Member Countries



CAREC= Central Asia Regional Economic Cooperation, GCI = Global Competitiveness Index, PRC = People's Republic of China.

Note: ranking is based on 140 countries (1 = best).

Source: WEF 2016.

CRC can set wagon freight rates according to market supply and demand within a tariff adjustment band based on not more than 15% rate increase with unlimited rate decrease. The rate change becomes effective one month after CRC notifies NDRC. For multimodal transport, CRC is free to set container transport rates, with price changes effective one month after filing.²³

67. Since it is easy to buy a truck and start hauling cargo, the PRC's truck market is highly fragmented²⁴ and extremely competitive. There is no regulatory entry barrier and truck operators are free to set rates.

68. Major value chain transformation also occurred within the last ten years. For the transport of high value goods, trucks are generally favored over rail. Instead of procuring goods from intermediaries in Urumqi, Central Asian buyers are now sourcing goods directly from factories in the PRC (e.g. Yiwu). Such goods are mostly manufactured in the PRC's coastal provinces and transport by sea is generally favored over rail.

69. The PRC's accession to the Transport International Routier (TIR) Convention, both domestic and foreign road carriers can compete with CRC for Central Asian and European cargo. TIR carnet enables sealed road transport shipments to traverse TIR MCs without undergoing customs inspection until reaching the destination country. Since 2018, European road carriers using two-driver teams have been able to transport goods between the PRC and Europe in half of the time it takes

PRC-Europe Express Container Trains. This source of competition is likely to grow as experienced European operators understand modern supply chain management and have advanced technologically capability compared with domestic truckers.

70. While in the past the PRC railways were a powerful monopoly that could dictate terms to customers, this market power is now being curtailed by these new competitive forces. CRC now needs to transform itself into an agile, flexible, customer-centered enterprise with an intimate knowledge of the freight market.

C. Market feedback

71. Interviews were conducted with shippers/receivers, freight intermediaries, truck companies and trade associations to understand market perceptions and market dynamics regarding rail usage. The findings are summarized in Table 3.1.

72. Based on the market feedback, railway is competitive for specialized cargo that is difficult to carry by truck and enjoys a clear niche for transporting bulk cargo and project cargo. It has significant advantages over trucks for cross-border traffic due to faster and simpler border inspections.²⁶ However, the vast majority of rail cargo can also be moved by trucks, over water or by pipeline (e.g. crude oil), so modal competition is intense and CRC must constantly seek to improve its services and reduce its costs to stay competitive.

²³ Even though coal is a strategic commodity, there is no rate regulation for coal moving in containers.

²⁴ The average size of a PRC truck operator is only 1.2 trucks.

²⁵ Border clearance procedures are sometimes changed at short notice. Recently the Kazakh Revenue Committee introduced time-consuming cargo examination procedures that can delay transit time by a week or more.

Table 3.1: Market Feedback on Rail Competitiveness for Different Traffic Types

Competitiveness	Traffic Type	Examples	Explanation of Rail Competitiveness
Rail is competitive	Project cargo, out-of-gauge cargo	Power generation equipment, mining equipment.	Rail has advantages for moving extra heavy, over-dimension cargo.
	Bulk cargo	Grain from northeast provinces.	Rail is efficient for handling bulk cargo, which often moves in specialized equipment to optimize loading and unloading. Particularly suitable for receivers with rail siding and facilities for loading/unloading.
	Crude oil and refined petroleum products	Imports from Russian Federation and neighboring countries.	Rail is the preferred mode for moving dangerous, volatile liquid cargo in tank wagons.
	Coal and minerals	Coal from Inner Mongolia, Shanxi, Shaanxi to market. Iron ore and coal from Mongolia.	Rail is efficient in handling coal and minerals, which often moves in trainload quantities using specialized equipment designed to optimize material transfer.
	Chemicals	Poisonous, flammable, corrosive cargo. Fertilizers and other chemicals using natural gas as feed stock.	Rail has advantages for safety and security which are often prime considerations, but some dangerous goods are banned. Government may ease restriction soon.
	Cross-border cargo	Freight moving in PRC–Europe express container trains.	CRC is a trusted party. Border management authorities are willing to cooperate in streamlining inspection.
	Cargo to locations with limited backhaul traffic	Cargo to Central Asia.	Shipper/receiver and freight forwarders do not have to manage empty containers when using rail wagons.
	Non-time sensitive cargo	Construction material to be accumulated prior to start of a project.	Shipper/receiver benefits from storage on wheels.
	High value cargo by express container trains	Laptop computers, apple products, premium wine.	Express container block trains do not stop for long at railway stations which greatly reduces the risk of thieves breaking in.
Rail is uncompetitive	Consumer products	Small to medium sized shipments going to a substantial number of receivers. Single party door to door responsibility is needed.	Road is generally less costly, faster and simpler to organize for less-than-wagon load cargo. Road is especially price competitive for shorter trips (e.g. 100–300 km) and for origins and destinations not located on railway line.
	Cargo origin and destination is far from rail stations or multimodal terminals	Many types of goods.	After adding origin to station and station to destination cost to station to station rail linehaul rates, the total is higher than all truck transport.

continued on next page

Table 3.1 *continued*

Competitiveness	Traffic Type	Examples	Explanation of Rail Competitiveness
	Highly time sensitive cargo	Trade exposition displays	Delivery in time for exposition date is essential. A German carrier recently transported such a shipment from Guangdong via Khorgos to UK by road using TIR carnet
	High value cargo	Electronics, designer fashions	Central Asian railways have high incidents of theft and shippers/receivers are not compensated by the railway for loss and damage. Truck driver teams are better at protecting high value cargo from theft ^a
	Perishables	Pharmaceuticals and vaccines. Chicken, pork, beef, fish and various types of seafood. Chilled and frozen processed food	Road is faster, more reliable (including real time tracking and tracing). Reefer mechanical failure can be fixed expediently. Rail is frequently short of reefer wagons

CRC = China Railway Corporation, km = kilometer, TIR = Transport International Routier.

^a A high value consignment of iPads was recently shipped by truck from the Foxconn factory in Shenzhen, Guangdong Province to Europe using TIR carnet.

Source: TA consultants.

D. Problems affecting rail competitiveness

73. Even though CRC has taken many steps to reform, it still faces significant problems that limit its competitiveness. These are discussed below.

74. **Poor connectivity with sea and river ports.** In the past, when MOR ran the PRC's railway system and MOT was responsible for ports, weaknesses in coordination between MOR and MOT led to ports being developed without an on-dock rail service. For example, when Shanghai's Yangshan Port (the largest cargo port in the world) was being developed, MOR did not provide a rail link to the port. This gave road transport a competitive advantage in hauling the large volumes of containers coming in and out of this busy port. After the 2013 railway reform, the CRC began to connect its railway system to ports, but it by that time road transport had consolidated its position as the key player in moving waterborne traffic. Today, less than 3% of port traffic has a prior or subsequent movement by rail. CRC's poor port

connectivity makes it less appealing to container shippers and receivers.

75. **Multimodal terminals are scattered and lack scale and scope.** CRC's multimodal terminals are substantially smaller than North American multimodal terminals and many European multimodal terminals. Most are also situated in congested urban areas, adding to the time and cost of pickup and delivery of containers. This was the case for the US railways thirty years ago. Subsequently, the US railways learned they can achieve higher efficiency by consolidating scattered multimodal terminals into large multimodal hubs situated at expressway and railway junction points outside of urban areas. Operating small, scattered, inefficient multimodal terminals increases the cost of using rail. Being located in congested urban areas increases the door to terminal and terminal to door cost and time for users. Together, these lessen CRC's competitiveness in competing with trucks.

76. **Reluctance to apply modern marketing principles to compete effectively.** CRC should study its markets carefully, segregating its customer

base to learn who can bear a higher rate due to special competitive advantages. The higher margins from such customers provide CRC with the resources to compete aggressively with other modes and to invest in new technology and equipment.

77. Inefficient and ineffective sales channels. CRC relies on a large number of freight forwarders to sell its services.²⁶ This means the quotes it provides to various freight forwarders may all be used to compete for the same cargo from the same shipper/receiver—making CRC compete with itself. This marketing approach is not only destructive to CRC's margin but also administratively inefficient.

78. The service quality of CRC's ordinary trains is often inadequate. Wagons that are not part of a block train may go through numerous classifications, each of which may take several days. A single twenty-foot container may wait for many days to pair up with another such container to fill a wagonload, and may then spend days being moved from marshalling yard to marshalling yard until a full train can be assembled. The same type of delay also applies for large project cargo shipments not enough to make a block train. This is a frequent complaint and most shippers and receivers simply cannot accept this level of service.

79. Limited track and trace capability. CRC's track and trace capabilities are poor. Information available from its web site is generally several days old.²⁷ Generally, there is only one customer service telephone line per railway station and it is often busy or unresponsive. For shipments between the PRC and Central Asia, timely track and trace are virtually

impossible when the cargo is in Kazakh, Uzbek, Kyrgyz, Tajik or Turkmen rail territory.

80. CRC can be difficult to do business with. Shippers and receivers report that for a brief period after the 2013 rail reform, CRC was friendly and responsive, but since then it has become more difficult to work with. The process of obtaining a price quotation and securing a wagon for loading is more arduous than when using road carrier. Road carriers are more willing to be flexible in order to secure traffic.

81. Wagon shortage and wagon quality problems. A good proportion of CRC's wagon fleet is dated or needs repair. There are seasonal shortages of specialized wagons during harvest periods in XUAR and other areas. According to shippers and freight forwarders, securing a wagon often depends on having a special relationship with CRC staff.

²⁶ About 25 years ago, the US railways faced a similar problem of an inefficient freight intermediaries' channel. They drastically reduced the number of freight forwarders (called intermodal marketing companies) by raising qualification requirements. This facilitated consolidation of freight forwarders which led to the emergence of strong, efficient companies with sufficient resources to invest in containers and other intermodal equipment.

²⁷ On the other hand, a forwarder and container leasing operator reported that good movement information can be obtained from a private information technology platform at a cost of \$5 per move. Cargo position information not more than 6 hours old will be transmitted within 20 minutes of sending an inquiry to the platform company. CRC should investigate how a private operator can disseminate its data better and faster than itself.

RAILWAY OPERATING AND FINANCIAL PERFORMANCE

A. Introduction

82. This chapter provides a short review of CRC's financial and operating performance. While CRC leads CAREC MC railways in many areas, its financial performance has weakened in recent years due to the enormous cost of investing in expansion of HSR service.

83. CRC operates a capital-intensive business in a competitive, low-margin environment. In the road transport market, there are a very large number of small operators. Due to intense competition they are under constant pressure to cut prices. This has driven trucking company margins to the low single digits. It has also eroded margins for railways since they have to compete with road transport for traffic. Unlike road carriers, CRC must also keep investing in costly infrastructure and long-life rolling stock assets.

B. Financial performance

84. CRC's financial statements are not compiled in accordance with International Accounting Standards. Audit of the financial statements is undertaken by a Chinese firm rather an internationally recognized accounting firm.

85. Summaries of CRC's 2016, 2017 and 2018 financial statements have recently been publicly disclosed to support the marketing of railway bonds

to raise additional finance for CRC. Highlights are provided in Tables 4.1 and 4.2.

86. CRC's income statements for the past three years (Table 4.1) indicate that profits are very low. While revenues have been growing steadily these have been offset by growth in expenses. The after-tax profit margin in 2018 was only 0.19% which is close to loss-making. The operating ratio of 1.12 was a further cause for concern. An operating ratio more than 1 is a sign of financial problems, since operating revenues are insufficient to cover operating expenses and need to be supplemented with funds from other sources such as borrowing.²⁸ In comparison, North American class 1 railways, which steadily improved their financial performances over the past two decades, generally have operating ratios less than 0.70.

87. For a capital-intensive business, CRC's operating results do not currently generate enough funds to finance capital expenditure. Its capacity to raise additional debt financing is currently contingent on an implicit sovereign guarantee.

88. CRC's balance sheet show it is highly leveraged, with a debt/equity ratio of 65.15/34.85 in 2018 (Table 4.2). Nearly all (94%) of the CNY4.5 trillion of long-term debt consists of borrowings from domestic banks, much of this in order to finance construction of the HSR network (Financial Times, 2018). The current ratio was 0.76 in 2018, indicating that current assets are insufficient to meet current obligations. The

²⁸ The operating ratio is defined as operating expense divided by operating revenue.

Table 4.1: Highlights from China Railway Corporation Income Statement, 2016–2018
(CNY million)

	2018	2017	2016
Transport revenues	765,857	694,254	592,836
Other revenues	329,674	321,195	314,612
Taxes on revenues	(5,175)	(4,980)	(4,183)
Total revenues	1,090,356	1,010,469	903,265
Working expenses	(680,413)	(633,454)	(585,608)
Depreciation	(175,373)	(136,073)	(122,846)
Other expenses	(179,442)	(189,014)	(164,013)
Total expenses	-1,035,228	(958,541)	(872,467)
Operating profit before tax	55,128	51,928	30,798
Non-operating expenses	2,866	(425)	1,244
Profit from subsidiaries	12,598	9,291	7,603
Construction funds after tax	(52,757)	(48,326)	(40,818)
Profit before tax	17,835	12,468	(1,173)
Income tax	(15,790)	(10,650)	2,249
Profit after tax	2,045	1,818	1,076
Working ratio	0.89	0.91	0.99
Operating ratio	1.12	1.11	1.20
Profit margin (%)	0.19	0.18	0.12

CNY = Yuan

Source: CRC financial statements supplied for bond offering.

Table 4.2: Highlights from China Railway Corporation Balance Sheet, 2016–2018
(CNY million)

	2018	2017	2016
Current assets	529,485	546,774	594,261
Total net fixed assets	7,472,854	7,101,613	6,657,000
Total assets	8,002,339	7,648,387	7,251,261
Total current debts	697,974	799,172	764,606
Long term debts	4,515,405	4,188,678	3,950,738
Total liabilities	5,213,379	4,987,850	4,715,344
Equity	2,788,960	2,660,537	2,535,917
Total liabilities and equity	8,002,339	7,648,387	7,251,261
Current ratio	0.76	0.68	0.78
Quick ratio	0.64	0.59	0.68
Debt/equity ratio (%)	65.15/34.85	65.21/34.79	65.03/34.97

CNY = Yuan

Source: CRC financial statements supplied for bond offering.

quick ratio was 0.64, indicating that cash, marketable securities and receivables can cover less than two thirds of current liabilities.

89. Therefore, while the PRC has developed one of the world's largest and most impressive railway networks, including a world-class HSR network, it faces significant challenges to bring this onto a financially sustainable basis.

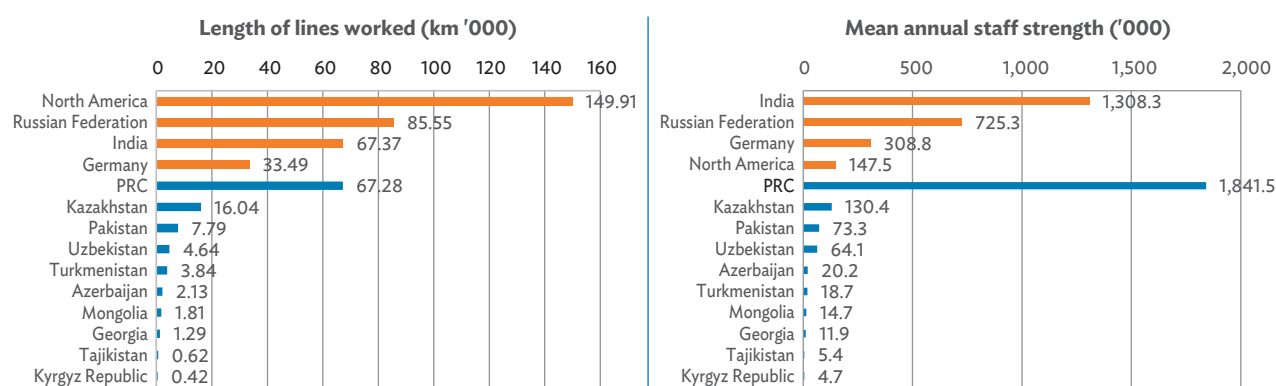
C. Operational benchmarking

90. Drawing upon railway operational data obtained from the International Union of Railways (UIC 2019),³⁰ various aspects of the operational

performance of CRC have been benchmarked in relation to other CAREC railways (except Afghanistan)³⁰ and leading railways from other regions (Germany, India, Russian Federation and North America).³¹ In most cases the data refers to operational activities in 2017. In other cases, it refers to the most recent year for which data is available.

91. In terms of size of railway network and number of employees, CRC is much larger than other CAREC railways and among the largest in the world. Its HSR network is the largest and most advanced in the world and second only to Japan in operating efficiency.³² In terms of staff strength, CRC leads the world—with more staff than Indian Railways and over 12 times the staffing level of North America, even though the North American network is more than twice the size of CRC's. This suggests that CRC may be overstaffed.

Figure 4.1: Comparison of Railway Length and Staff Size in the PRC, other CAREC Member Countries and other Leading Railway Countries



CAREC= Central Asia Regional Economic Cooperation, km = kilometer, PRC = People's Republic of China.

Note: CAREC Member Countries shown in blue, comparators from other regions shown in red.

Source: UIC 2019.

²⁹ The UIC database consists of data self-reported by individual railway organizations.

³⁰ The UIC database does not yet include data for Afghanistan so it is not included in the benchmarking analysis.

³¹ In addition to the national railways of CAREC countries, the sample includes Indian Railways (India), Deutsche Bahn AG (Germany), RDZ (Russian Federation) and the Association of American Railroads (North America) which represents the major freight railways of Canada, Mexico and USA.

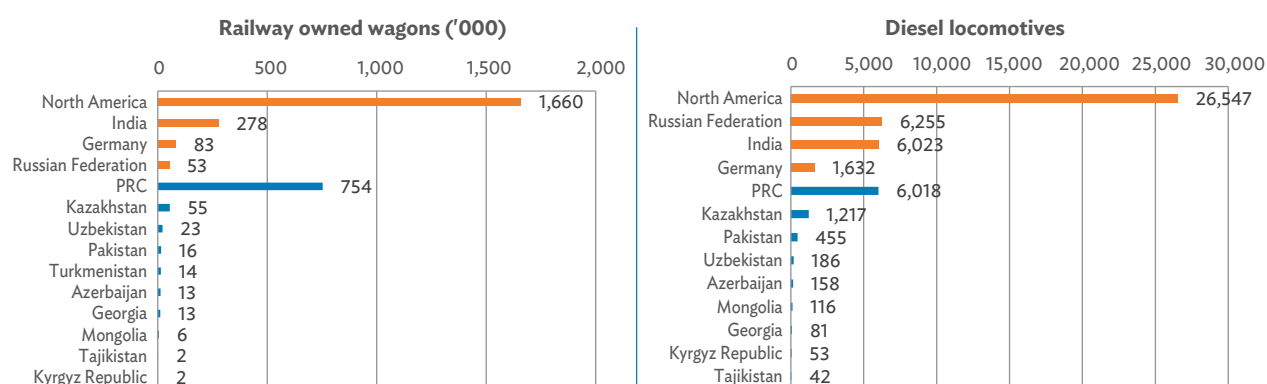
³² Japan has achieved 3-minute train separation and capable of running its bullet trains on dual use tracks. The PRC has so far achieved 5-minute train separation by running its high-speed trains on dedicated HSR tracks.

92. Compared with CAREC railways, CRC has much larger fleets of owned wagons and diesel locomotives. It has more owned wagons than Germany, India and Russian Federation but fewer than North America. It has more diesel locomotives than Germany, similar numbers to India and Russian Federation but fewer than North America. This is probably due to the high proportion of electrified lines in the CRC network. This is shown in Figure 4.2.

93. Despite a limited number of wagons, CRC has the third highest annual freight turnover among the five rail operators. For passenger traffic, CRC achieved the second highest passenger turnover, providing a variety of service products at different ticket prices. This is shown in Figure 4.3.

94. Track density measures the intensity of track utilization in terms of traffic turnover per km of rail.

Figure 4.2: Comparison of Railway Rolling Stock Fleet in the PRC, other CAREC Member Countries and other Leading Railway Countries

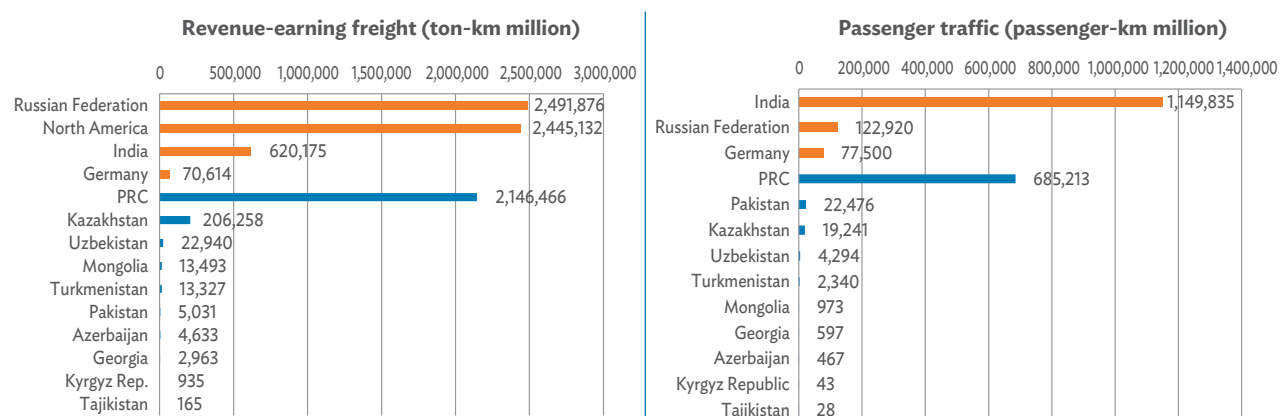


CAREC= Central Asia Regional Economic Cooperation, PRC = People's Republic of China.

Note: CAREC Member Countries shown in blue, comparators from other regions shown in red.

Source: UIC 2019.

Figure 4.3: Comparison of Annual Railway Freight and Passenger Traffic Levels in the PRC, other CAREC Member Countries and other Leading Railway Countries



CAREC= Central Asia Regional Economic Cooperation, km = kilometer, PRC = People's Republic of China.

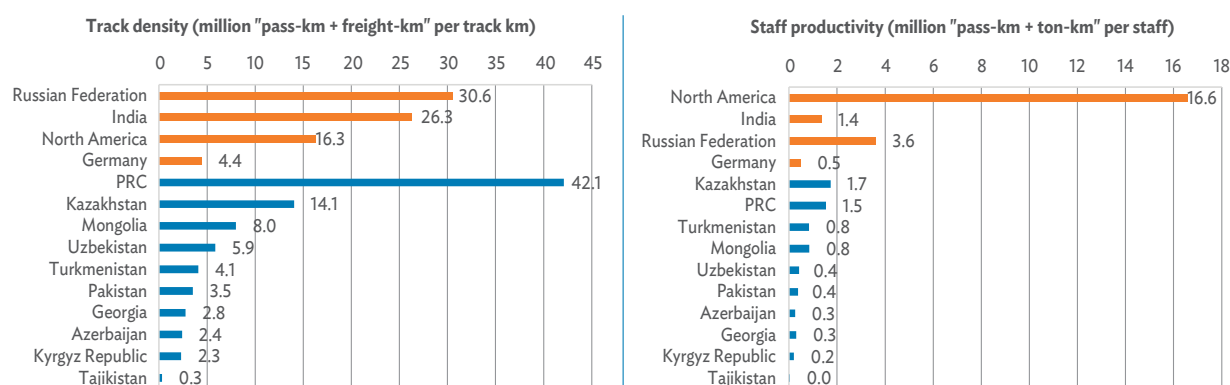
Note: CAREC Member Countries shown in blue, comparators from other regions shown in red.

Source: UIC 2019.

As Figure 4.4 indicates, CRC's track density is the highest in the world. On the other hand, CRC staff productivity is among the lowest in the world—only 9% of the US staff productivity. This provides a further indication of possible CRC overstaffing.

95. CRC has the highest locomotive productivity and second highest wagon productivity among the CAREC MCs. This is shown in Figure 4.5.

Figure 4.4: Comparison of Railway Track and Staff Productivity in the PRC, other CAREC Member Countries and other Leading Railway Countries

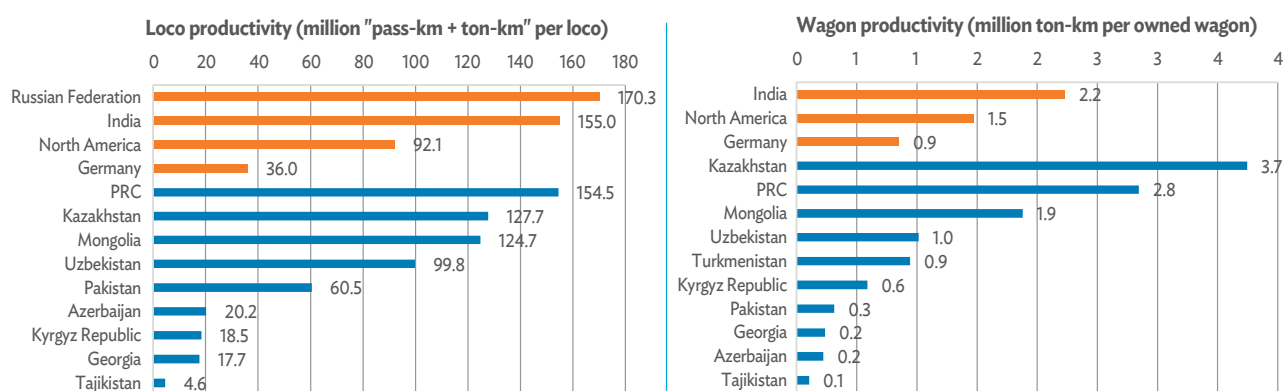


CAREC = Central Asia Regional Economic Cooperation, km = kilometer, PRC = People's Republic of China.

Note: CAREC Member Countries shown in blue, comparators from other regions shown in red.

Source: UIC 2019.

Figure 4.5: Comparison of Locomotive and Wagon Productivity in the PRC, other CAREC Member Countries and other Leading Railway Countries



CAREC = Central Asia Regional Economic Cooperation, km = kilometer, PRC = People's Republic of China.

Notes: (1) CAREC Member Countries shown in blue, comparators from other regions shown in red; (2) productivity calculations are less accurate for countries with higher use of leased locomotives or wagons, such as Kazakhstan.

Source: UIC 2019.

PROPOSALS FOR INVESTMENT, COMMERCIALIZATION AND REFORM

A. Introduction

96. Drawing on the previous chapters, this final chapter discusses opportunities for railway sector development in the PRC that are relevant for CAREC, and identifies promising proposals to be considered for prefeasibility study and knowledge study support through the present CAREC Railway Sector Development TA.

B. Policy setting

97. With a strategic vision of “building a moderately prosperous society,” the 13th Five-Year Plan, 2016–2020 provides the PRC’s overall policy directions to guide national development. The following overall directions are especially relevant for railways: (i) coordinated development that integrates the various parts of society and the economy, (ii) green development, including promotion of clean, lower carbon types of transport including railways, (iii) encouraging fair competition, break-up of monopolies and removing market barriers, and (iv) “opening up” through regional and global economic integration to increase prosperity, including through financing and implementation of the Belt and Road Initiative (BRI). With a view to optimizing the contribution of the different transport modes for the benefit of customers, in the transport sector the plan calls for development of a comprehensive, integrated, multimodal transport system, including integration of freight modes and improving multimodal transport and logistics efficiency, and connecting domestic and international transport

routes. Construction of railways in the central and western regions, including routes to and from XUAR are Railway construction investments are prioritized (Central Committee of the Communist Party of China 2015).

1. Commercialization and reform

98. The 13th plan is therefore strongly supportive of the policy of commercialisation of railway operations, as initiated by the 2013 railway reform, and subjecting railways and all other transport modes to open market competition. While the government may see CRC’s financial sustainability as an issue to be solved over the medium-to-longer term, it expects CRC to improve the quality and competitiveness of its services in order to attract traffic. Since railways are considered a priority mode for supporting trade by providing efficient cross-border transport, CRC is expected to address issues of organizing international railway services and addressing capacity bottlenecks, missing links and service limitations that affect cross-border railways or will do in future.

99. While there is no single best practice model for improving the commercial performance of railways, experience in other countries indicates that one of fundamental requirements is to introduce an accounting system, based on International Accounting Standards, that separately identifies the financial performance of each of the main lines of business. CRC currently does not have such a system in place and needs to develop one in order to have reliable, current information about how its businesses are performing, where to direct sales and marketing

efforts, and which investments will have the greatest impact on business performance.

100. As discussed in Chapter 3, the policy of providing subsidies to accelerate the expansion of international container block train services to Europe and Central Asia has successfully met its objective but has also led to some inefficient practices. Based on indications from NDRC and MOF, these subsidies will be phased out over the next two years. Rather than providing subsidies, government should develop strategies to strengthen the sustainability of international block train services by improving sales and marketing, improving international coordination and management of the block train services, and developing solutions to problems of insufficient backhaul cargo from Europe and Central Asia to the PRC.

C. Proposals for support from CAREC Railway Sector Development TA

101. The following proposals for TA support are based on the findings of the TA consultants' country visit to the PRC.

1. Prefeasibility studies

102. PRC-Kyrgyz Republic-Uzbekistan Railway. As discussed in Chapter 1, this project would form part of CAREC Subcorridor 202, providing a direct rail connection between the

PRC and Uzbekistan's Fergana valley via the Kyrgyz Republic. Most existing railway traffic is offloaded at Kashgar to be transported by road to the Fergana valley, which is very costly, or has to follow a circuitous route to Uzbekistan via Kazakhstan. A direct rail connection would reduce journey distance and delivery time for some traffic and could also be attractive for transit traffic.³³ It might therefore attract substantial traffic, especially from the PRC to Uzbekistan, Kyrgyz Republic, Tajikistan, Turkmenistan and Afghanistan, as well as traffic from these countries to the PRC. It might also attract traffic to and from Iran, the Middle East and Southern Europe. Construction would be challenging and costly due to the mountainous terrain. A previous study by the PRC reportedly estimated that the length of the new railway would be 268 km (48 tunnels and 95 bridges) but a later Kyrgyz Republic study proposed a northerly alignment that was 380 km in length (Levina 2018).

103. This proposed project would offer the following benefits: (i) to the PRC: expand trade with Central Asian countries and beyond, accelerate BRI, increase CRC's revenues from cross-border traffic, and support for economic development of Kashgar; (ii) to the Kyrgyz Republic: gain access to high quality rail services in the southern part of the country, additional income from railway transit fees, and expansion of trade and economic development in Osh, Jalalabad and southern parts of the country; and (iii) to Uzbekistan: reduce logistics costs leading to expansion of industry and agroindustry, expand trade with the PRC, attract transit traffic between the PRC and other countries in Central Asia and beyond, and gain rail access to additional countries via the PRC including ASEAN countries.³⁴

³³ According to some reports, the project would reduce journey distance for some traffic by 900 km and delivery time by 7–8 days (CTI Engineering 2012).

³⁴ The Ministry of Commerce informed the TA consultants that the PRC's trade with Uzbekistan was more than CNY6 billion in 2017. This large trade volume has led to substantial Chinese investment in Uzbekistan (including Chinese participation in development of a special economic zone in Djizzak), which will drive further trade growth between the two countries.

104. The PRC, Kyrgyz Republic and Uzbekistan are still considering how to proceed with this project. Issues requiring attention include (i) choice of alignment, (ii) technical specifications, including railway gauge, (iii) operating arrangements, (iv) ownership structure; (v) investment financing, and (vi) tariffs. Since ADB is a trusted development partner of each of the countries pursuing the project, it is uniquely positioned to act as honest broker in carrying out a prefeasibility study to recommend an optimal approach to the project that can reconcile the interests of the three countries.³⁵

105. Development of Urumqi as a transload hub for PRC–Europe and PRC–Central Asia trains. Chinese media and industry reports indicate that a substantial percentage of PRC–Europe and PRC–Central Asia container block trains consist of empty containers or containers stuffed with worthless cargo in order to make up the minimum of 41 containers to constitute a block train. This practice is wasteful and generates avoidable greenhouse gas emissions. A transload hub at Urumqi would make it possible to consolidate partially filled trains from various origins, supplemented by Urumqi’s own traffic, to make up full block trains to Europe and Central Asia. Once established, this would enable smaller cities unable to create their own block trains to send containers to Urumqi for consolidation.

2. Knowledge products and events

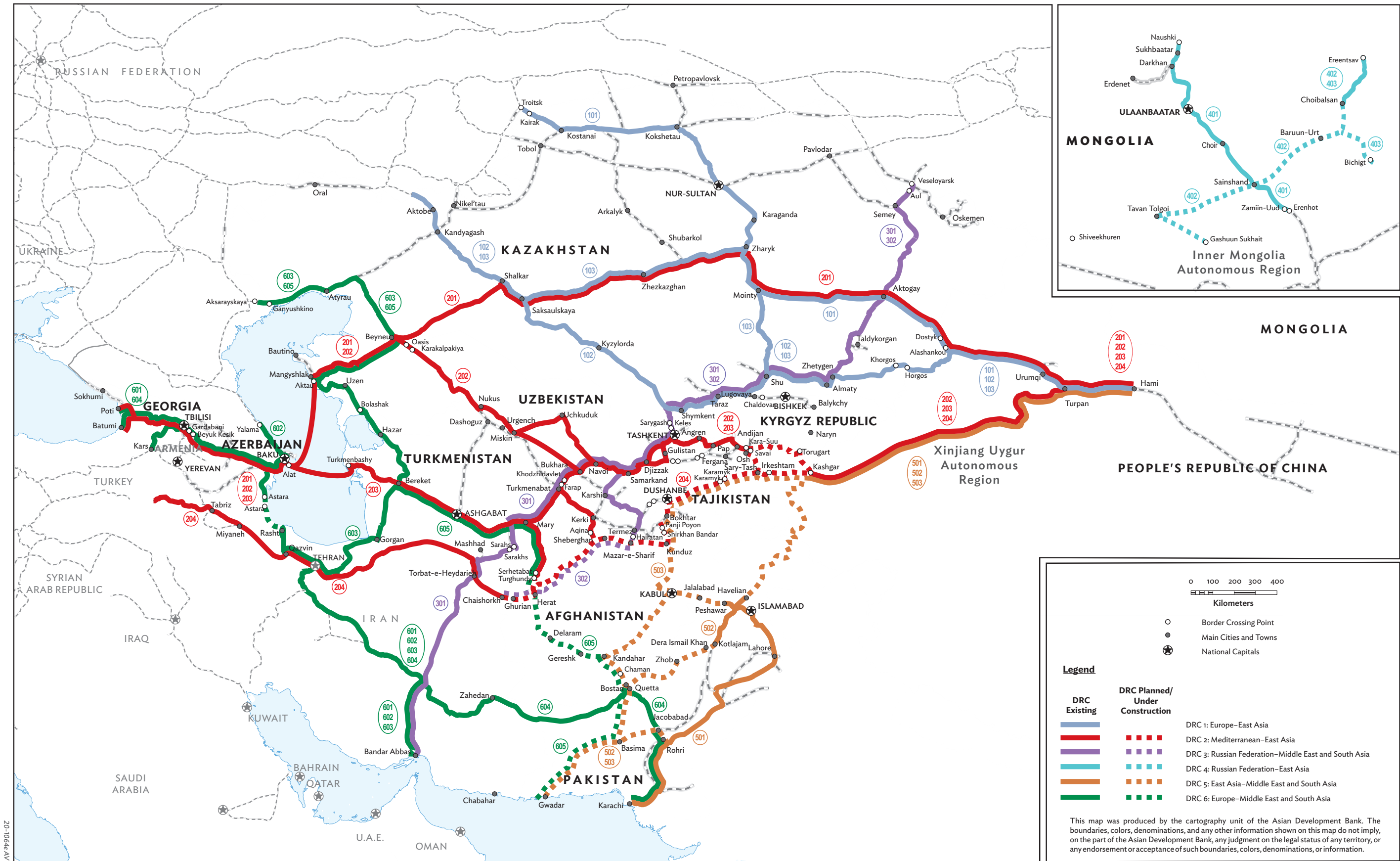
106. Study of options to enhance transloading capacity at CAREC border crossings. As discussed in Chapter 2, the rapid growth of PRC–Europe and PRC–Central Asia railway traffic will soon lead to saturation of transloading

capacity at Alashankou/Dostyk and Erenhot/Zamiin-Uud (also at Manzhouli) and is likely to do so at Khorgos/Altynkol before long. The proposed study will determine how much transloading capacity is remaining and assess the remaining time before bottlenecks develop at each gateway. It will examine options for enhancing transloading capacity, including infrastructure expansion, material handling equipment acquisition, as process management improvements, adoption of Total Quality Management principles (e.g. Kaizen cycle for continuous improvement), changes in operations protocol (e.g. instead of the receiving country’s railway performing the transloading, let the railway best equipped to handle transloading do the work) and introduction of new technology (especially information technology). Benchmarking of successful container handling operations at European and North American ports and multimodal terminals could be included.

107. Study of missing port railway connections to improve CRC’s connectivity to CAREC corridors. As discussed in Chapter 3, most of the PRC’s ocean and river ports were developed without integrated railway connections. As a result, only a small proportion of waterborne freight has a prior or subsequent movement by rail. This is inefficient and prevents CRC from serving large volumes of freight to be transported to and from PRC ports. It also lessens the competitiveness of CAREC railway corridors, especially those serving land-locked countries such as Mongolia, that require efficient onward transport to and from PRC ports. The proposed study would examine the need for upgrading of port–rail connectivity at ocean and river ports relevant for CAREC trade.

³⁵ This TA’s railway sector assessment report for Kyrgyz Republic has also proposed upgrading of the existing multimodal terminal at Balykchy, the rail terminus of the northern line of Kyrgyz Railways, to make it easier for containerized traffic to and from Kashgar to connect with the Kyrgyz Railway for onward transport to Kazakhstan, Uzbekistan and other Central Asian countries. This would serve partly an interim measure prior to realization of the proposed PRC–Kyrgyz Republic–Uzbekistan Railway.

APPENDIX | CAREC DESIGNATED RAIL CORRIDORS



DRC = designated rail corridors.
Source: CAREC Secretariat.



REFERENCES

Asian Development Bank (ADB). 2016. *Country Partnership Strategy: Transforming Partnership: People's Republic of China and Asian Development Bank, 2016–20*. ADB: Manila.

———. 2017. *Unlocking the Potential of Railways: A Railway Strategy for CAREC, 2017–2030*. ADB: Manila.

———. 2018. *Railway Sector Development in Central Asia Regional Economic Cooperation Countries. Technical Assistance Report*. ADB: Manila.

———. 2019. *Basic Statistics, 2019*. ADB: Manila.

An Pei, Xin Hua New Agency, 2015. Critical progress made on improving the railway freight price mechanism. http://www.gov.cn/xinwen/2015-01/30/content_2812681.htm

Central Committee of the Communist Party of China. 2015. *Recommendations for the 13th Five-Year Plan for Economic and Social Development*. Central Compilation and Translation Press

Che, T. et al. 2017. *Asia-Europe International Rail Multimodal Transport*. ISBN 978-7-113-23390-7. China Railway Publishing House.

CTI Engineering. 2012. *Master Plan on Road and Transport Sector Development (2010–2025)*. ADB Grant 0123-KGZ.

International Union of Railways (UIC). 2019. *UIC Statistics*. <https://uic.org/support-activities/statistics/>

ITF. 2019. *Enhancing Connectivity and Freight in Central Asia*, International Transport Forum Policy Papers, No. 71. OECD Publishing: Paris.

Financial Times. 2018. China's high-speed rail and fears of fast track to debt. 14 August 2018. <https://www.ft.com/content/ca28f58a-955d-11e8-b747-fb1e803ee64e>

Levina, M. 2018. China-Kyrgyzstan-Uzbekistan Railway. *Worldview*. <https://worldview.stratfor.com/article/china-kyrgyzstan-uzbekistan-railway-improve-attractiveness-central-asia>

National Bureau of Statistics. 2019a. *Indices of National Accounts*. <http://data.stats.gov.cn/english/tablequery.htm?code=AC02>

———. 2019b. *Basic conditions on transport*. <http://data.stats.gov.cn/english/tablequery.htm?code=AC0L>

NDRC. 2015. Order No. 29, 2015 of the National Development and Reform Commission of the People's Republic of China. http://www.ndrc.gov.cn/zcfb/zcfbl/201510/t20151020_755152.html

———. 2016. Notice of the National Development and Reform Commission on reforming and improving the passenger fare policy of the high-speed rail. http://www.nra.gov.cn/zwzc/flfg/gfxwj2/201602/t20160222_21192.htm

United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). 2017. *Comprehensive Planning of Eurasian Transport Corridors to Strengthen Intra & Interregional Transport Connectivity*. Study Report.

Wang Yang, Xin Hua New Agency, 2015. Several Opinions of the CPC Central Committee and the State Council on Advancing the Reform of the Price Mechanism (Full Text) http://www.gov.cn/xinwen/2015-10/15/content_2947548.htm

World Economic Forum (WEF). 2016. The Global Competitiveness Report 2016–2017. WEF: Geneva.

World Trade Organization. 2019. World Trade Statistical Review 2019. https://www.wto.org/english/res_e/statis_e/wts2019_e/wts19_toc_e.htm

Wu, J., Y. Liu, et al.. Forthcoming. Railway Reform in China. Chapter 20 of Handbook on “Transport and Urban Transformation in China.” Edward Elgar.

Yardeni Research. 2019. Global Economic Indicators: China Railways Traffic. https://www.yardeni.com/pub/chinarailtraffic_bb.pdf