INTERNATIONAL UNION
OF RAILWAYS

Roland Berger

RAIL FREIGHT IN CENTRAL ASIA AND MIDDLE EAST

Project results

Paris, July 2022

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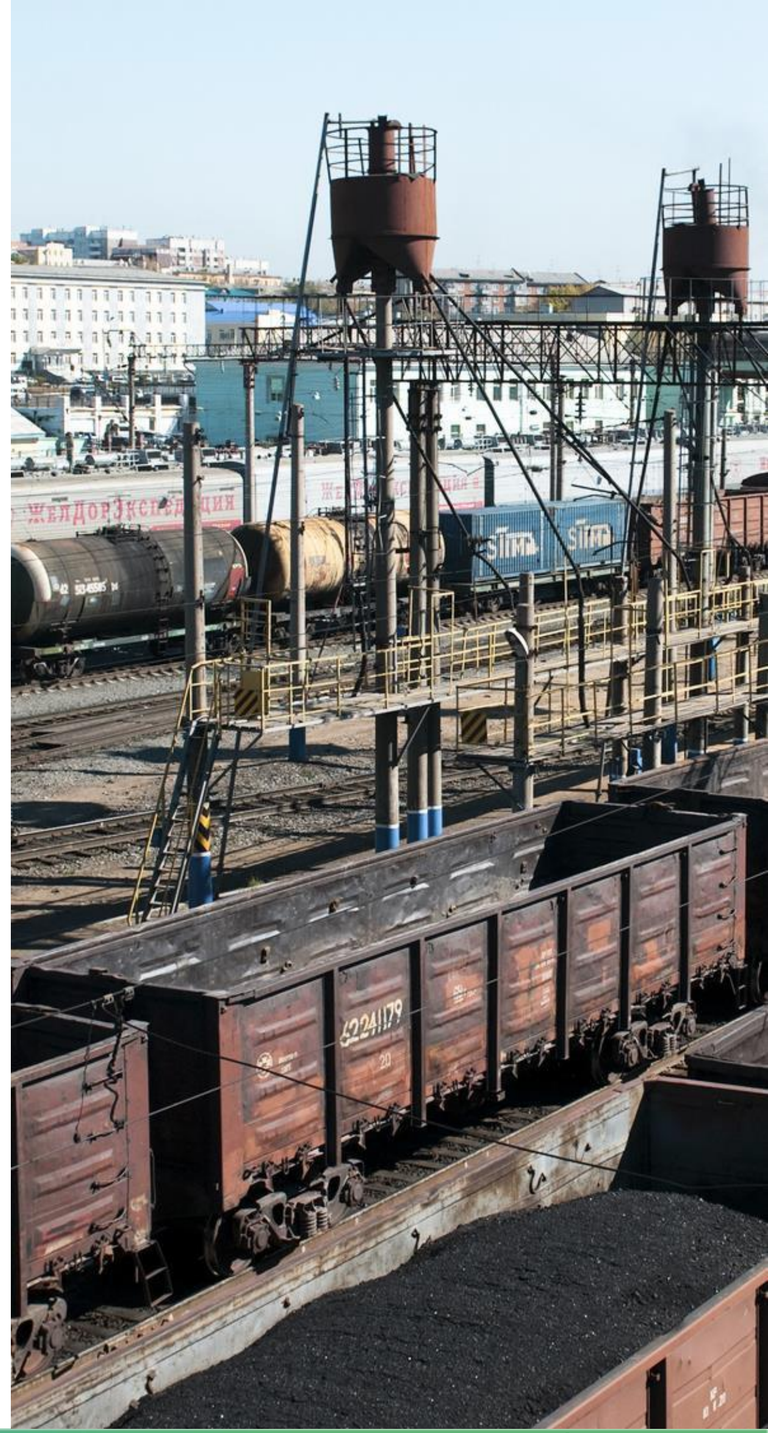
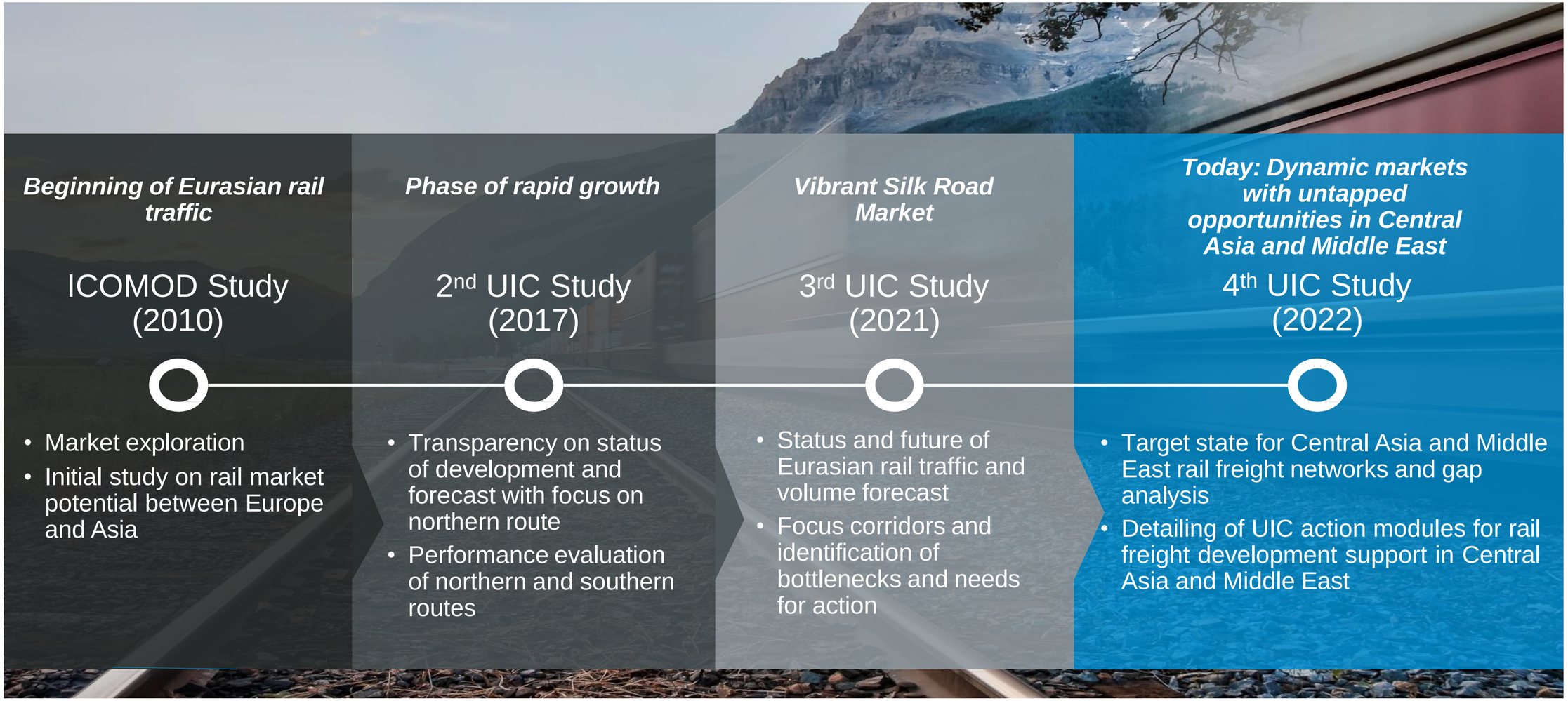
A. Introduction and approach



The 4th UIC study focuses on deriving UIC action plans for Central Asia and Middle East rail freight

Our work with UIC and objectives of this study



A broad set of sources informed the development of UIC action plans to support rail freight targets

Overview of approach and outcomes

Approach

Selective **complementation and updating of qualitative and high-level quantitative insights for Central Asia** from 3rd UIC study (2021) and **overview assessment for Middle East** based on inputs from wide range of sources:

- Conduction of **interviews** with experts from 10 different rail freight stakeholders in Central Asia and Middle East
- Analysis of **rail market reports and sector statistics** (e.g., CAREC, OSJD, World Bank)
- Assessment of trade flows via **global trade databases** (e.g., IMF, UN Comtrade)
- Further overview of current developments via i**nternational press research**

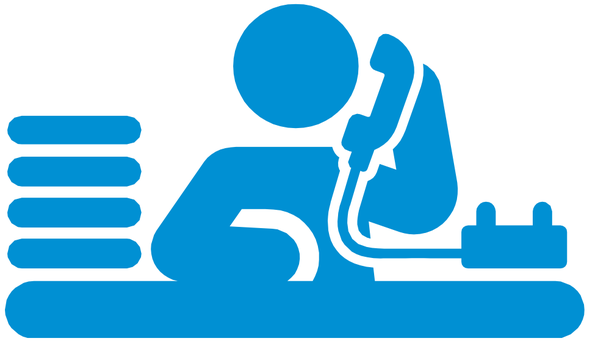
Outcomes

- **Status quo** of rail freight networks
- Key regional **rail freight development bottlenecks** incl. selected country deep dives
- Proposal for regional **target state view** of rail freight, **network development focus areas** and **gap analysis**
- Formulation of **detailed UIC action plans** to support rail freight development in Central Asia and Middle East

~ 5 weeks

List of interview partners

Type	Association	Interviewee role	Date of Interview
Int. Organization	TRACECA	Expert on Integrated border management	17.06.2022
Int. Organization	UIC	Expert on Integrated border management	21.06.2022
Operator	DB Cargo Eurasia	Executive board member & Head of Int. Governance	20.06.2022
Operator	Far East Land Bridge (FELB)	Former executive board member	22.06.2022
Operator	Rail Cargo Group	Board member & Segment manager EURASIA	04.07.2022
Operator/Wagon leaser	VTG	Eurasia Expert	23.06.2022
National railway	Etihad Rail	Director Sales & Planning	27.06.2022
National railway	Saudi Arabia Railways (SAR)	Freight Operations Manager & VP of Real Estate	27.06.2022
National railway	TCDD Tasimacilik	Deputy head of freight department	27.06.2022
National railway	Railways of the Islamic Republic of Iran (RAI)	Inhouse freight experts	Written response



Index of abbreviations (1/2)

Abbreviation	Meaning
bn	Billion
BOO	Build, Operate, Own
BOT	Build, Operate, Transfer
BTK	Baku-Tbilisi-Kars
c.	circa
CA	Central Asia
CAGR	Compound Annual Growth Rate
CAREC	Central Asia Regional Economic Cooperation Program
esp.	especially
EU	European Union
EUR	Euro
GCC	Gulf Cooperation Council
GHG	Greenhouse Gas
h	hours
IATA	International Air Transport Association
e.g.	Exempli gratia
IMF	International Monetary Fund
Int.	International
IoT	Internet of things

Abbreviation	Meaning
ITA	International Trade Administration
JV	Joint Venture
k	thousands
km	Kilometer
KPI	Key Performance Indicator
KTZ	Kazakhstan Temir Zholy
LNG	Liquified natural gas
m	Million
mm	Millimeter
n/a	not available
NGO	Non-Governmental Organization
O-D	Origin-Destination
OECD	Organization for Economic Cooperation and Development
OSJD	Organization for Cooperation of Railways
Q	Quarter
RAME	Regional Assembly Middle East
TER	Trans-European Railway
TEU	Twenty-foot equivalent unit
TITR	Trans-Caspian International Transportation Route

Index of abbreviations (2/2)

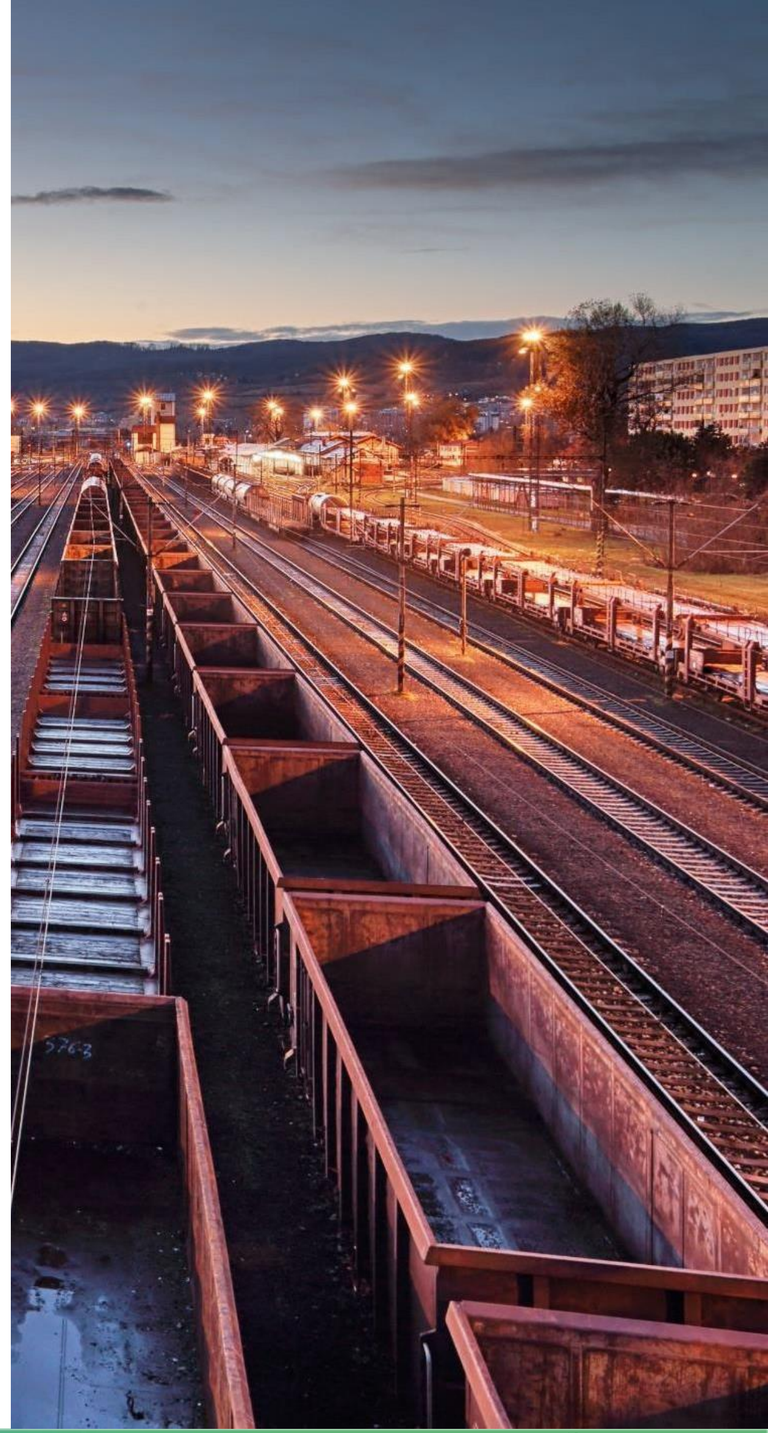
Abbreviation	Meaning
TRACECA	Transport Corridor Europe-Caucasus-Asia
Transp.	Transportation
UIC	Union Internationale de Chemins de Fer
UN	United Nations
USD	US-Dollar
ZEV	Zero emission vessel
&	and
<	Less than
>	More than

Index of country codes

Code	Country
AFG	Afghanistan
ARM	Armenia
AZE	Azerbaijan
BAH	Bahrain
BUL	Bulgaria
CHN	China
CZE	Czech Republic
ESP	Spain
FIN	Finland
FRA	France
GEO	Georgia
GER	Germany
HUN	Hungary
IND	India
IRN	Iran
IRQ	Iraq
ISR	Israel
ITA	Italy
JOR	Jordan

Code	Country
OMN	Oman
KAZ	Kazakhstan
KSA	Saudi Arabia
KYR	Kyrgyzstan
NLD	Netherlands
PAK	Pakistan
QAT	Qatar
ROU	Romania
RUS	Russia
SVK	Slovakia
SYR	Syria
TAJ	Tajikistan
TKM	Turkmenistan
TUR	Turkey
UAE	United Arab Emirates
UZB	Uzbekistan
YEM	Yemen

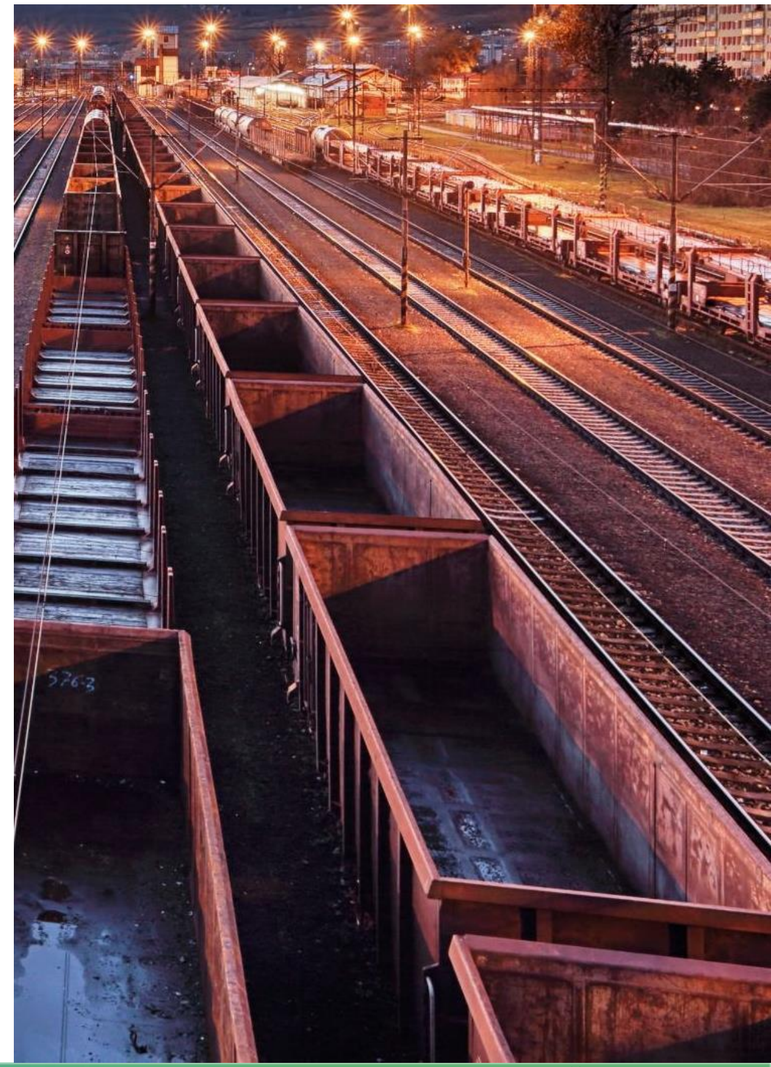
B. Executive Summary



Executive Summary (1/3)

Background and approach

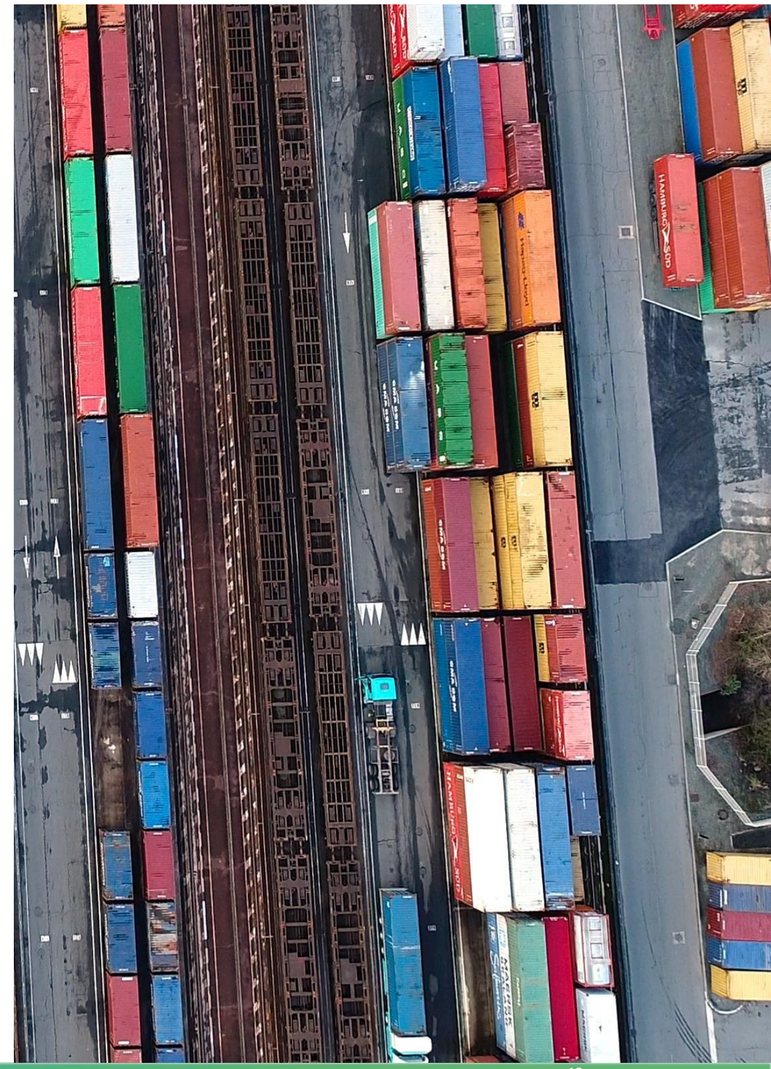
- The **2021 UIC market study** demonstrated the **high demand potential for rail freight in Asia** and identified key areas of future development
- Since then, UIC has observed a **rising demand for rail freight in Central Asia,** further accelerated by current geopolitical developments – However, **significant development challenges remain** to exploit the full potential of rail freight
- In 2022, UIC also initiated the **creation of a Middle East rail freight group (RAME)** to address the growing interest of the region for rail freight development
- In this context, **UIC has commissioned Roland Berger** to conduct a **study on the key development support needs** for rail freight in Central Asia and Middle East and **establish regional support activity plans** for UIC
- The **objective of this study** is to create **transparency on the status quo** of rail freight in Central Asia and Middle East, **highlight bottlenecks**, **derive a target picture for rail freight** in both regions and **identify activities where UIC can provide significant value** to its members for rail freight development
- The study has drawn **information and insights from a variety of sources**, including professional databases, institutional reports, press research, and most importantly, interviews with many stakeholders of rail freight in CA and ME



Executive Summary (2/3)

Central Asia rail freight development

- **Central Asia rail freight is gaining significant momentum** due to a sharp growth of demand for Middle Corridor transit services as complementation to a geopolitically increasingly risky North Corridor
- **Volume increase of Middle Corridor remains limited** as key **infrastructure and rolling stock capacity bottlenecks and service quality challenges persist**, South Corridor via Iran still not operational
- In the **target state 2030**, **Middle and South Corridor** are expected to be **well-established and commercially viable Eurasian rail links**, with c.400 k TEUs freight volume and a **competitive service quality vis-à-vis North Corridor**
- To bridge existing network gaps and achieve the target state ambitions, **two main areas of activity for UIC support** were identified: **(1) Promoting the target state vision** and raising awareness for further development fields; **(2) Establishing a Central Asia rail freight group** to drive and coordinate development projects
- Within the Central Asia rail freight group, possible areas for **value adding initiatives** from UIC have been identified in **rolling stock procurement, process digitization/standardization and service transparency enhancement**
- As **immediate action plan**, UIC should aim to present target state view in major rail conferences in Q4/2022 and kick off CA rail freight group meetings by Q1/2023

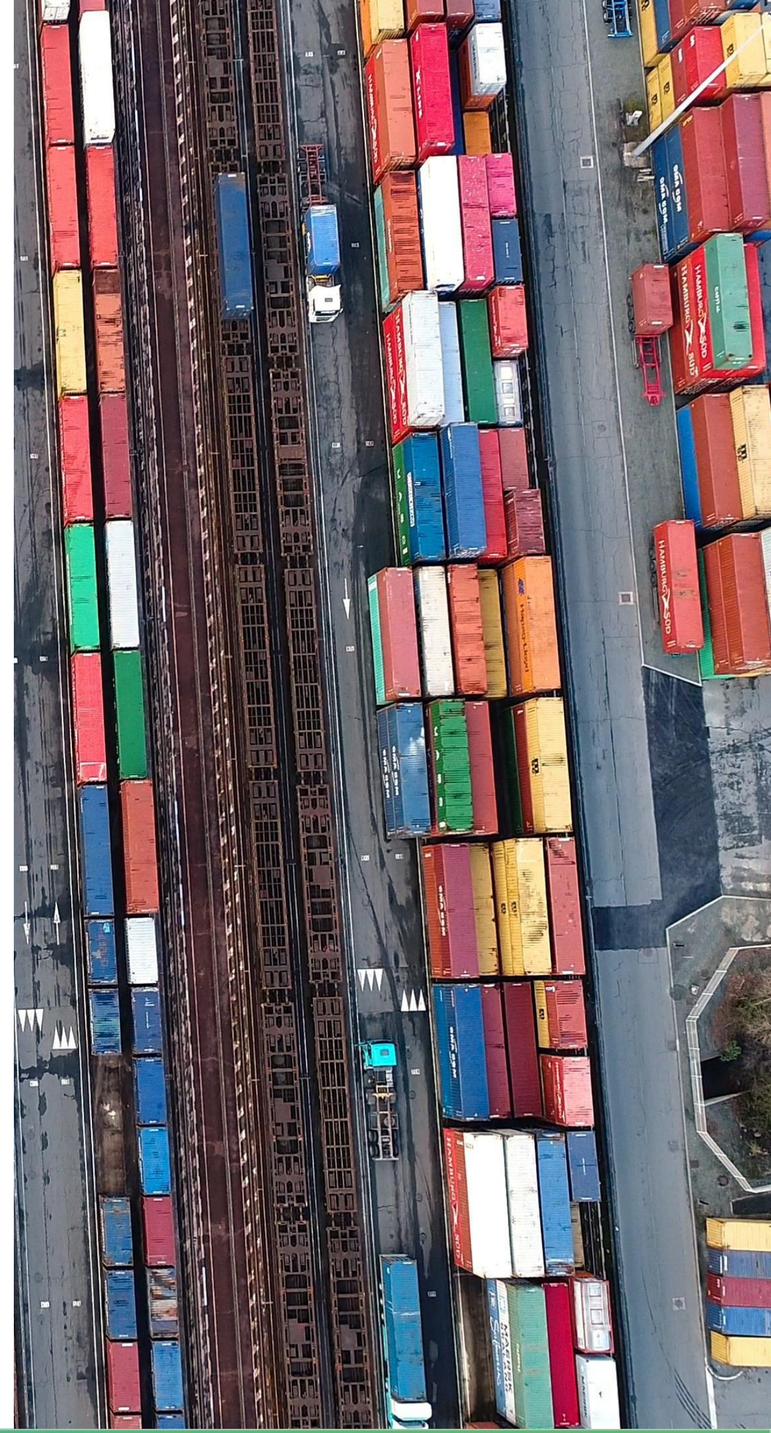


Executive Summary (3/3)

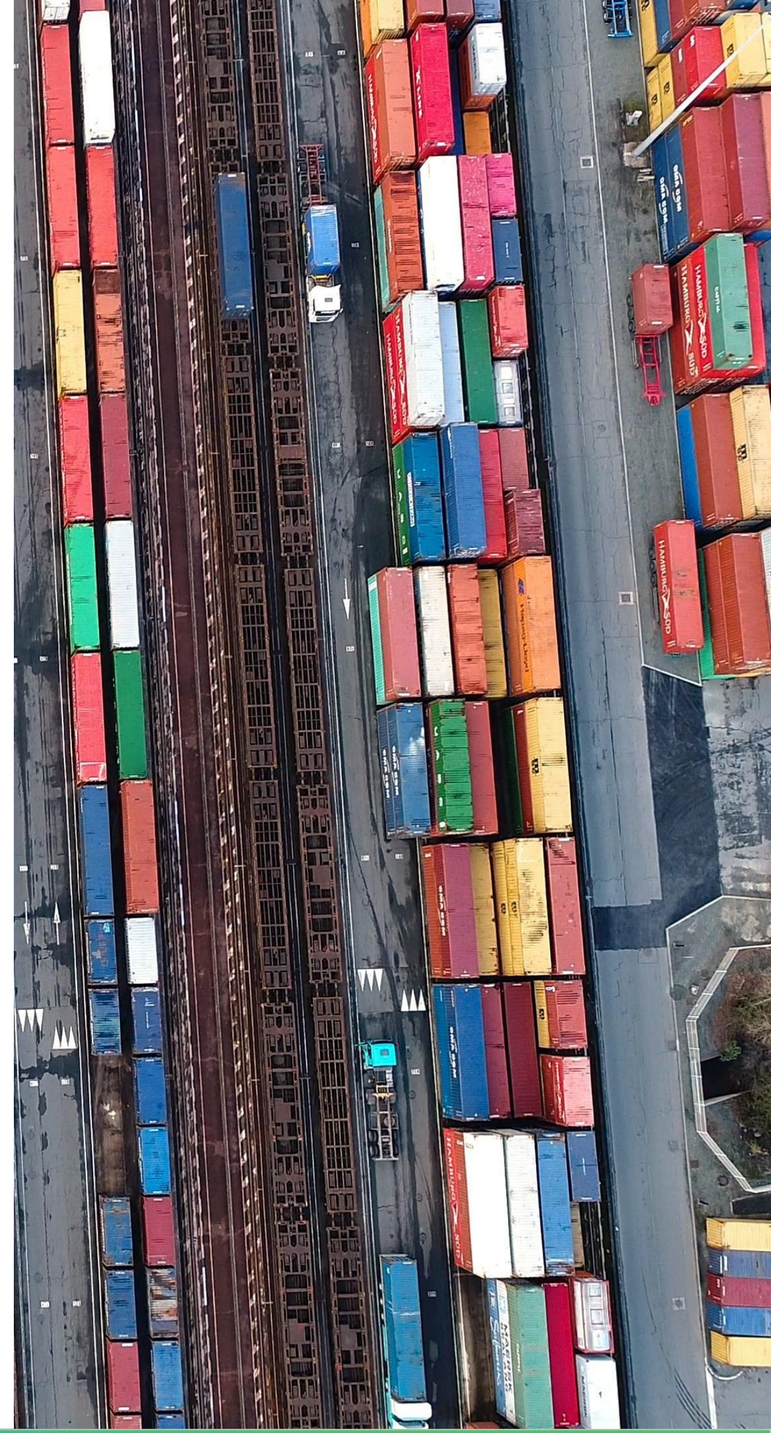
Middle East rail freight development

- **Rail freight has only played a minor role for logistics in Middle East** to date – In recent years, **governments are increasingly emphasizing the relevance of rail for logistic networks** and establishing ambitious policies to strengthen rail
- Currently, **significant challenges exist for rail freight development** in ME, notably the lack of established track networks and terminals, limited rolling stock fleets, and scarce experience in rail operations and project execution – Political instability also hindering access to necessary financing in several countries
- In the **target state 2030**, **rail is connected to key inland and port logistic hubs** of ME countries to achieve a **modal share >10%** for land freight volumes and establish **rail as commercially viable transport solution** along key regional trade lanes
- To bridge existing gaps for target state of rail in ME, **three main areas of support activities** were identified for UIC: **(1) Promote national rail target states and diffuse knowledge** on rail freight, **(2) Operationalize RAME freight group**, and **(3) Establish rail freight development support toolkit**
- As **immediate action plan**, UIC should align target state view with RAME group, develop support toolkit overviews and present toolkits to RAME group to identify concrete projects for kick-off in Q1/2023

C. Central Asia



C.1 Current status of rail freight



Central Asian rail freight is gaining momentum driven by demand increase for Middle Corridor

Overview of recent developments

1 Increased demand

- **C.20-40% reduction of North Corridor transit volumes** compared to 2021 with war sanctions against Russia in force, **gradual rebound** of volumes observed
- **Increase in demand for Middle Corridor** to diversify Eurasian transit options, however **volume impact limited** due to Middle Corridor capacity bottlenecks
- Pressure on global supply chains and Russian gas import ban creating **additional demand inroads for rail freight** in CA

2 Ambitious policies

- Several CA countries with **comprehensive national rail freight strategies** introduced in recent years
- Esp. Turkey with **ambitious plan to expand rail modal share**, increasingly attracting international suppliers and operators as new growth market
- TITR, TRACECA, CAREC and other organizations supporting regional rail network development, **significant capacity and service quality challenges remain**

3 Challenging projects

- Several **major infrastructure projects** currently **with indefinite planning horizon**, e.g., expansion of Baku port, new deep-sea port in Georgia and completion of AZE-IRN link
- **Increased demand for Middle Corridor services** seen as accelerator for public investment
- Gradual **progress regarding consistent application of CIM/SMGS** consignment notes on Middle Corridor, operational challenges remain

4 New service offerings

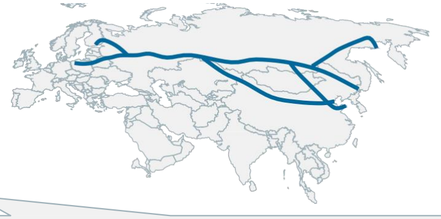
- **New ferry services** introduced at Caspian Sea and Black Sea
- Selected operators with **new rail services across Middle Corridor**, e.g., ADY, Maersk, further operators announced intention to enter Middle Corridor **Price levels** for Middle Corridor remain **significantly higher** than North Corridor
- Actual transit times for current Middle Corridor services vary between 30-60 days, **containerization rate remains low**

Source: Expert interviews, Press research, Roland Berger

Key driver for higher demand is need for complementary services to diversify North Corridor risks

Updated transport volumes

North Corridor volumes



"Eurasian freight volumes along the North Corridor have decreased by c.20-40% in 2022 compared to 2021 – EU customers are leaving the corridor due to security concerns and moral questions" **- Operator**

"The North Corridor is still very relevant for us – Transit traffic is barely touched by sanctions and operations are working smoothly, we expect freight volumes to recover to near crisis levels soon", **- Operator**

"We have observed a significant increase of rail traffic between CHN and RUS, also for goods on EU sanction lists", **- Operator**

Middle Corridor volumes

"Demand for Middle Corridor has increased this year. The volume increase, however, is negligible since the corridor still lacks sufficient capacities to serve customers", **- Operator**

"European freight forwarders are highly interested in adopting the Middle Corridor as alternative to North Corridor, but with current prices and transit times, the best alternative is air or sea freight", **- Operator**

"Everyone is currently talking about the Middle Corridor – However, we believe large volumes will be possible only in the upcoming 3-5 years", **- Operator**

View from market participants

Outlook

1 Demand focus shift

Eurasian traffic via North Corridor expected to rebound back in range of 2021 levels in in medium term – Simultaneously, European customers seeking complementary services via Middle Corridor to diversify transport risks

2 Capacity development

No significant increase in Middle Corridor freight volumes is expected before completion of key corridor infrastructure and process development projects

3 Market volatility

Highly volatile market dynamics expected to create further volume fluctuations in the short- and medium-term outlook

Existing line Ferry service

Source: Expert interviews, Press research, Roland Berger

As a result of the increased demand, several new Middle Corridor services are being offered

Middle Corridor service offering development

Service	O - D	Transit	Via	Transit time[1)]	Operator	Frequency	Service start
Train	**Xian - Duisburg**	KAZ, AZE, GEO, BUL	Aktau, Poti, Varna	31 – 33 days	RAIL BRIDGE CARGO	n/a	06/2022
Train	**Pavlodar - Tehran**	TKM	-	6 days	KTZ EXPRESS	Pilot project	06/2022
Train	**Chongqing - Kotka**	KAZ, AZE, GEO, ROU	Aktau	n/a		4x per month	05/2022
Train	**Xian - Duisburg**	KAZ, AZE, HUN	Aktau, Poti, Budapest	30-35 days	CEVA LOGISTICS	4x per month	05/2022
Train	**Xian - Mannheim**	KAZ, AZE, GEO, ROU, HUN, SVK, CZE	Aktau, Poti, Constanta	23-25 days	XI'AN PORT	1x per month	04/2022
Train	**Xian - Duisburg**	AZE, TUR	Baku, Istanbul	n/a	NUNNER LOGISTICS	n/a	04/2022
Train	**Xian - Constanta**	KAZ, AZE, GEO, TUR	Aktau, Poti	16-18 days	MAERSK	4x per month	04/2022
Train	**Zhengzhou - Narvik**	KAZ, AZE, GEO, ROU, FIN	Poti, Constanta	22-27 days		n/a	04/2022
Train	**Suzhou – Poti**	KAZ, AZE	Baku, Poti	22 days[1)]	TopRail Log.	2x per month	04/2022
Train	**Xian - Baku**	KAZ	Aktau	23 days	ADY CONTAINER	Pilot project	11/2021
Train	**Gliwice - Izmit**	ROU, HUN	-	5 days	PKP cargo	4x per month	05/2021
Feeder vessel	**Black Sea**	-	-	4 days	ADY CONTAINER	6x per month	05/2022
Feeder vessel	**Turkmenbashi – Baku**	-	-	0.5 days	ADY CONTAINER	n/a	01/2022

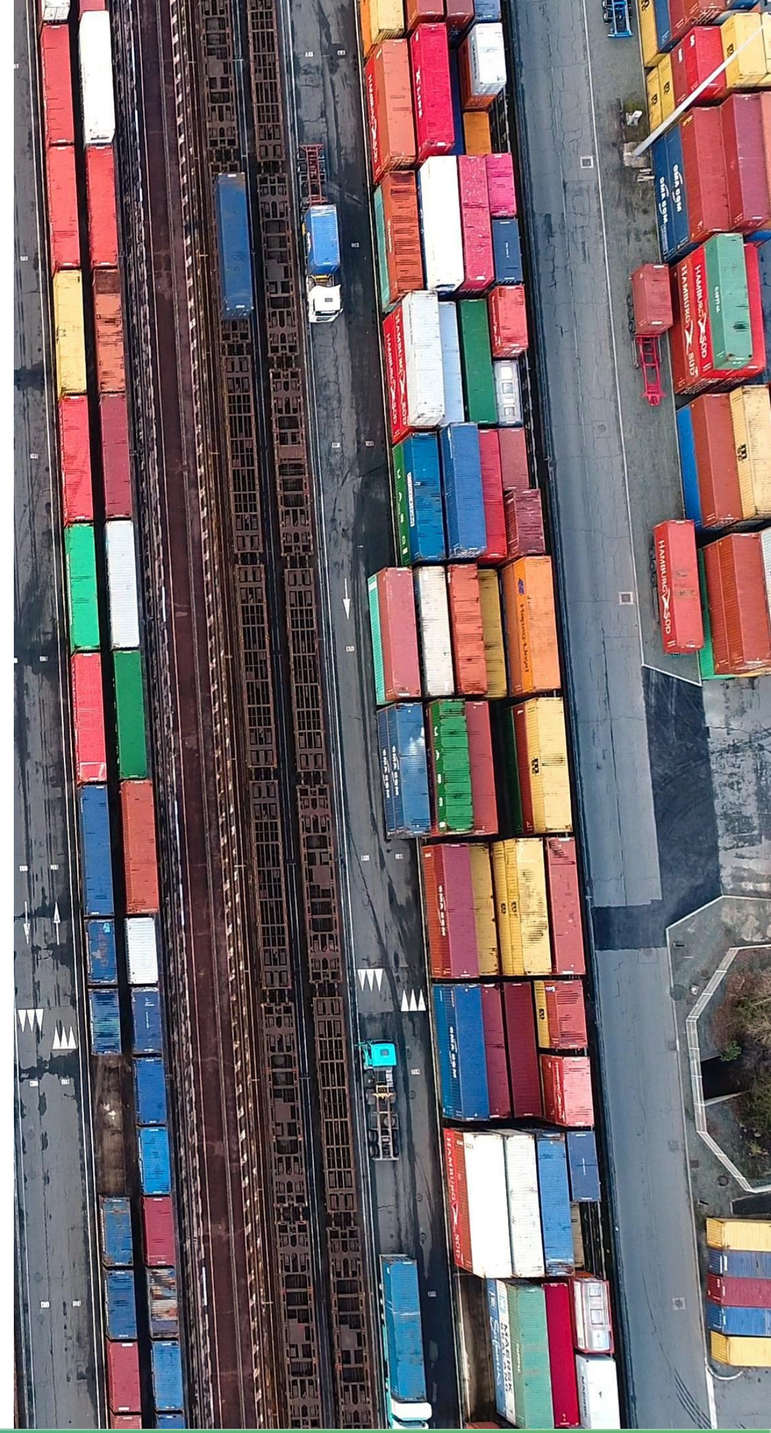
Further developments

- **DB Cargo** announced creation of a **new daughter company DB Cargo Transasia** to grow presence along the Middle Corridor
- **TITR** announced launch of a **JV for Middle Corridor operations** between AZE, GEO, TUR & KAZ by 2023
- Still **no service offering using South Corridor** via Iran, expected to gain relevance after lifting of sanctions

1) Publicly communicated transit time, actual transit times can diverge significantly in individual cases

Source: Press research, Roland Berger

C.2 Selected country deep-dives (Azerbaijan, Georgia, Iran, Kazakhstan, Turkey)



Rail competitiveness in Central Asia limited by fragmented services and capacity constraints

Key Central Asia (CA) rail development bottlenecks

Limitations in service capacity and connectivity

- Ageing rail infrastructure and rolling stock fleets, significant moder-nization required
- Port terminals and ferry services not equipped for larger freight volumes
- Inland terminals lacking capacity for block trains, esp. in Caucasus region
- Time consuming interoperability at border crossings
- Process digitization at very early stage

Sanctions and geopolitical conflicts

- Sanctions on Iran preventing access to Eurasian freight transport routes and constraining economic development
- Political conflicts and vested national interests significantly complicating regional project development
- Sanctions on Russia limiting economic growth and negatively impacting demand for trade shipments along North-South corridors

Fragmented and untransparent product offering

- Fragmented geographic network with numerous border crossings and non-harmonized border procedures
- Strong variation in price levels and quality of services
- Freight forwarders still inexperienced with Middle Corridor, limited awareness for service offering and scarcity of active players on corridor

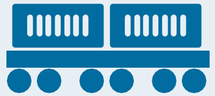
Slow progress on key rail freight projects

- Key capacity projects with unclear timeline, e.g., modernization of Baku port, inland terminal expansion in GEO, link between AZE-IRN, fleet overhaul in TUR
- Significant financing gaps for larger investments
- Unstable political and economic outlook reducing investment attractiveness for potential partners

General competitive environment

Addressable demand for rail freight limited

- Middle Corridor catchment area in Europe limited to economically marginal regions
- Rail transport in CA mostly constrained to bulk goods with small containerization rate, esp. in Caucasus short travel distances and mountainous geography favor road transport
- East-West trade imbalance further decreasing rail modal competitiveness



Strong competitiveness of North Corridor

- North Corridor rail infrastructure and rolling stock fleet in good condition with large available capacity
- Reliable, large-volume block train services with integrated service offering and pricing
- Transit transport between China and Europe via Russia still feasible, strong increase of volumes between China and Russia

Source: Roland Berger

Industry experts are optimistic for the future of the Middle Corridor if bottlenecks are addressed

Selected expert statements

"400,000 – 500,000 TEUs per year remain an ambitious but realistic target for the Middle Corridor",
- Operator

"The railways are ready for a significant increase of goods – The ports are the bottlenecks in terms of lacking capacity",
- Rail association

"The Caucasus region requires more investments into its dry ports – The mountainous area makes rail transport hard there",
- Rail association

"We should not view the Middle Corridor as competition to the North Corridor but as necessary complementation of it",
- Forwarder

"Route tariff calculation really needs to be more transparent and understandable for freight forwarders. There is a big difference currently depending on which operator in which country is addressed, this is scaring potential customers off",
- Int. organization

"Freight forwarders and operators from different countries along the Middle Corridor need to cooperate more with European counterparts – European forwarders do not have enough knowledge of Central Asia currently",
- Int. organization

"As much as we would like to use the Middle Corridor more nowadays – When transit times can be longer than 45 days it is just too slow to stay competitive",
- Operator

"A full operationalization of the electronic CIM/SMGS consignment and a reliable legal framework will be key to increase transport volumes along the Middle Corridor",
- Forwarder

"A lot of information is only shared bilaterally – We need to cooperate more and share our knowledge better – Especially via digital platform solutions",
- Int. organization

"Many great achievements were made in the past 12 months – Now it is crucial that these efforts continue to reduce the capacity gap to the North Corridor"
- Rail association

Source: Expert interviews, Roland Berger

AZE rail as key connection for Middle Corridor via Baku port and BTK line to Georgia and Turkey

Azerbaijan (AZE) current status and ambition

Overview of rail system

Track length (km)

2,140

Rail tonnage (ton-km m)

4,861

- Mainly broad gauge (1520 mm), 1,169 km (c.54%) of tracks electrified, c.80% of rail goods transported in international traffic
- Two corridors for international transport, 1. from Baku to Georgia via Tbilisi to Kars (since 2017), and 2. from Iran via Rasht to Astara (International North-South Corridor, not finalized)
- Currently, no railway link to Armenia as a result of geopolitical conflict
- Multimodal transport via Caspian Sea key for corridor development, new feeder vessel between Baku and Turk-menbashi (TKM) since 2020, Baku-Aktau (KAZ) with greater capacity

Modal split

Land freight transport (%)[1)]

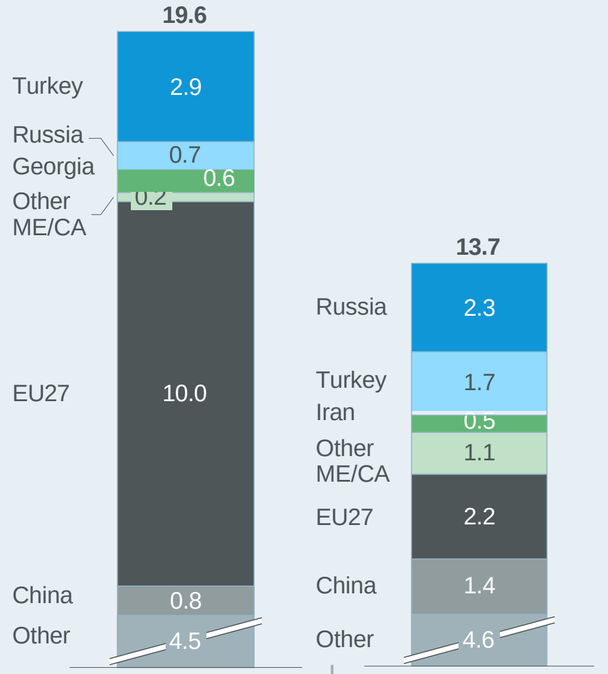
Rail 35% | Road 65%

- Rail as historically important inland transport mode, however strong decline of rail modal share in 2010s, road transport increasingly dominant
- AZE rail infrastructure with significant need for modernization, esp. regarding multimodal and cross-border connections

Key targets/policies

- Create new China-KYR-UZB-TKM-AZE-Europe rail freight route and expand Silk Road service along Baku-Tbilisi-Kars railway line
- Expansion of Port Baku and Trans-Caspian ferry connections as international logistics hub
- Comprehensive reform of AZE Railways under national railway sector development plan

Trade statistics (2019; USD bn)



Top Export Goods (USD bn)[2)]

Oil and minerals[3)]	7.3
Vegetable products	0.6
Textiles	0.2
Metals	0.2

Top Import Goods (USD bn)[2)]

Machinery/Electrical	0.9
Metals	0.9
Chemicals	0.6
Oil and minerals	0.6

1) Data from 2020. In 2019, share of road transport was 78%, sharp decline due to Covid-19 effects in 2020
2) For trade with CHN, TUR, RUS, GEO, ITA, GER & ESP 3) Includes 1% non-oil related products e.g. salt, earths & stones

Source: CAREC, IMF, OECD, OSJD, UN Comtrade, Expert interviews, Press research, Roland Berger

Port of Baku and ferry services as key capacity bottleneck for corridor shipments via AZE

Azerbaijan key rail freight bottlenecks

1. High need for infrastructure modernization, ageing terminals and rolling stock, esp. Baku port as expected capacity bottleneck (c.150,000 TEUs annual throughput)
2. Trans-Caspian ferry services not with required level of reliability and capacity for anticipated freight volumes, no scheduled services exist
3. Slow border procedures at Baku port ferry crossings as reloading and customs cannot be conducted in parallel, consignment harmonization with TKM missing
4. Cross-border connection to Iran via Rasht still unfinished due to financing difficulties following sanctions on Iran and vested interests
5. Geopolitical tensions with Armenia hindering development of new East-West rail corridors

Source: Expert interviews, Press research, Roland Berger

GEO with Poti and Batumi ports as main gateway for Black Sea shipments in Middle Corridor

Georgia (GEO) current status and ambition

Overview of rail system

Track length (km)

1,411

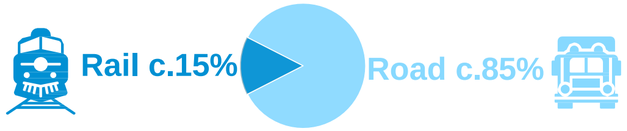
Rail tonnage (ton-km m)

2,926

- Broad gauge (1,520 mm) network, fully electrified, 295 km of double tracks
- Georgia Railways (GR) responsible for rail freight operations and infrastructure
- Growing importance of GEO for Middle Corridor via new Baku-Tbilisi-Kars route and Black Sea link from Poti/Batumi ports
- Rolling stock fleet of GR decreased by 30% between 2005-2015, Poti/Batumi ports lack deep water access
- New ferry services from GEO to Southeast EU being established, e.g., Poti-Constanza (ROU)
- Inland terminals serve short trains only, new terminals planned at Kutaisi and Kumisi

Modal split

Land freight transport (%)

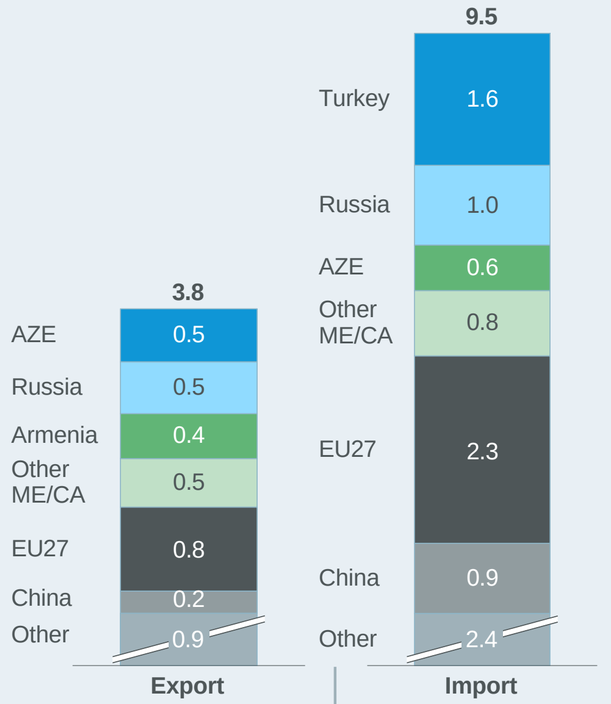


- Sharp decline in rail freight transport since 2014 esp. due to shift of crude oil transport to pipelines, containerization rate increased to 9.5% in 2018
- Oil-related bulk products, ores and construction freight are leading rail freight commodities

Key targets/policies

- Modernization of existing infrastructure, esp. rolling stock fleet, Black Sea deep-water port development and multimodal inland terminals at Kutaisi and Kumisi
- Improve railway commercialization, asset productivity and freight market competition
- Increase containerization rate and improve cooperation between rail and shipping line operators

Trade statistics (2019; USD bn)



Top Export Goods (USD bn)[2]

Oil and minerals	0.6
Transp. vehicles & parts	0.6
Foodstuffs	0.4
Metals	0.2

Top Import Goods (USD bn)[2]

Oil and minerals	1.2
Machinery/Electrical	0.4
Transp. vehicles & parts	0.2
Chemicals	0.2

1) Public-private partnership 2) For trade with ARM, AZE, CHN, RUS, BUL, ROU & GER

Source: CAREC, IMF, OSJD, UN Comtrade, Expert interviews, Press research, Roland Berger

Increasing capacity and service quality at inland and port terminals is key for rail freight in GEO

Georgia key rail freight bottlenecks

1. Inland rail terminals are old and lack infrastructure to serve long trains, mountainous geography requires time-consuming wagon transport resulting in high charges and low throughput at transit terminals

2. Service quality and reliability for Black Sea ports limited, capacity constraints expected if volumes increase further due to lack of deep see port, comparatively high charges for ferry and port handling

3. Limited wagon availability and quality, existing fleet not equipped to meet specialized needs of shippers, time-consuming track gauge change at Turkish border

4. Pressure on prices from expanding road transport network – Abundantly available fleet of trucks with cheaper shipping rates for regional routes, e.g., to TUR

5. Insufficient harmonization of pricing schemes, customs and consignment procedures between GEO, AZE, and Caspian Sea/Black Sea partner countries

Source: Expert interviews, Press research, Roland Berger

IRN with well established rail network and border connections, sanctions key limitation for corridor

Iran (IRN) current status and ambition

Overview of rail system

Track length (km)

9,146[1)]

Rail tonnage (ton-km m)

34,859[1)]

- Standard gauge rail with 1,426 km double-track lines, incl. Tehran-Qom/Mashhad link and Bafg-Bandar Abbas link to the Persian Gulf, c. 5% of network electrified
- Main entry points into Iran for Silk Road from TKM via Sarrakhs, North-South corridor via Incheboroun (limited operations) and from AZE via Astara-Rasht (to be finalized)
- From TUR, Van Lake ferry crossing required, service quality limited
- New ferry feeder service from Aktau (KAZ) to Anzali port, >2,200 TEUs volume in 2020
- India to connect to IRN rail via Chabahar port
- IRQ-IRN rail crossing planned until 2023

Modal split

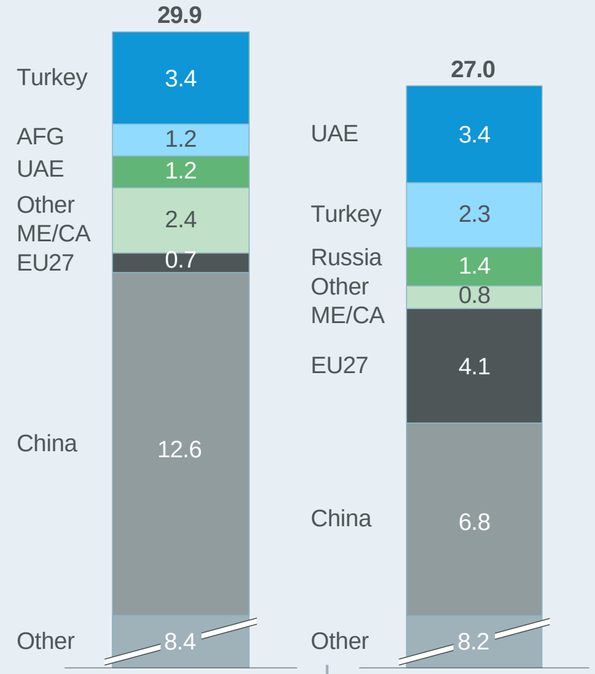
Land freight transport (%)[1)]

- Rail network infrastructure well established, however very limited Silk Road transit traffic due to severe sanctions on IRN
- North-South rail corridor lacks key connections, RUS offering investment support to finalize Astara-Rasht route

Key targets/policies

- Increase rail freight modal share to 30% (c.195 m tons/year)
- Increase transit share of rail freight traffic to 40% (currently 20%), e.g., via CHN-KAZ-IRN and KAZ-TKM-IRN corridor
- Improve connections to key neighbor countries, e.g., Chabahar port, AZE and IRQ border crossings
- Electronic exchange of border documents with TUR and TKM

Trade statistics (2019; USD bn)



Top Export Goods (USD bn)[2)]

Oil and minerals[4)]	9.1
Chemicals	3.8
Plastics/Rubbers	3.6
Metals	2.1

Top Import Goods (USD bn)[2)]

Machinery/Electrical	6.1
Chemicals	3.1
Vegetable products	2.3
Metals	1.6

1) Data for 2018 2) Data for 2018 for trade with AFG, CHN, TUR, UAE, GER, ITA & NLD 3) Includes 35% non-oil related products e.g. salt, earths & stones

Source: IMF, OSJD, RAI, UN Comtrade, World Bank, Expert interviews, Press research, Roland Berger

Sanctions prevent integration of IRN in corridor services, regional cooperation limited

Iran key rail freight bottlenecks

1. Sanctions on Iranian economy by EU and USA and political conflicts with TUR and AZE preventing integration of IRN rail network in southern corridors
2. Lack of consignment harmonization and limited track gauge change capacities at TKM border, Sarakh only functioning crossing (single track, non-electrified)
3. Financing and political support missing for key infrastructure projects, e.g., Rasht-Astara link and full operationalization of Incheboroun crossing
4. Terminal capacity bottleneck at TUR border crossing and unreliable Van Lake ferry crossing critically increase transit times for South Corridor
5. Large infrastructure modernization investments required, yet lower trade and transit volume via Iran due to sanctions make financing questionable

Source: Expert interviews, Press research, Roland Berger

KAZ offers broad network of rail lines and strong rail competitiveness due to long distances

Kazakhstan (KAZ) current status and ambition

Overview of rail system

Track length (km)

16,060[1)]

Rail tonnage (ton-km m)

231,783[2)]

- Extensive broad gauge (1,520 mm) network, 4,216 km electrified and 4,900 km double track
- Increasing liberalization of rail freight market, now c.75,000 private freight wagons vs. c.55,000 KTZ state-owned wagons
- KAZ network integrated in all Silk Road corridors and North-South corridor, c.54% of rail freight turnover is related to international transport
- Rail ferry from Caspian Sea port Aktau to Baku as key link for Middle Corridor, no fixed service schedule, on avg. every 3-5 days
- Close cooperation for corridor development via memberships in TRACECA, TITR, EEU

Modal split

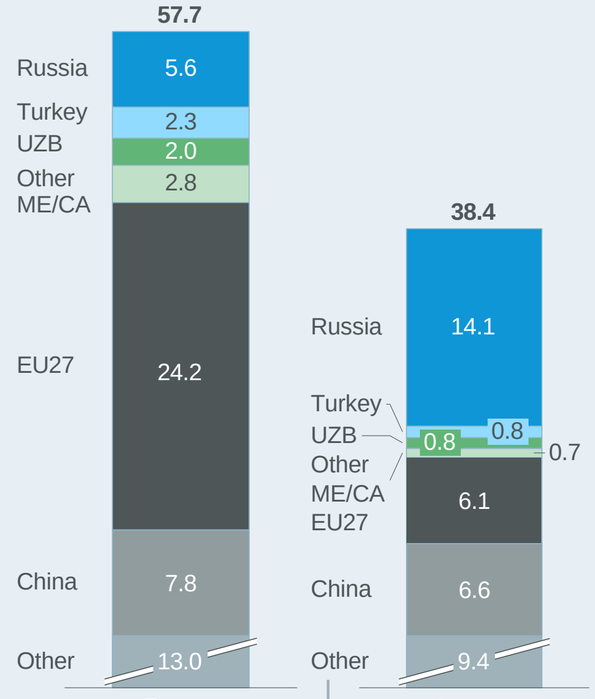
Land freight transport (%)

- Rail freight turnover slight increase by CAGR of 1,6% since 2010, higher growth of road transport volumes in same period
- High competitiveness of rail due to long distances and large share of bulk freight, esp. oil, coke and ores, yet east-west trade imbalance pressuring service quality

Key targets/policies

- Increase containerization rates along Middle Corridor and enable regular block train services
- Improve quality, availability and reliability of Caspian Sea shipping services
- Terminal infrastructure and rolling stock fleet investments to reduce risk of capacity bottlenecks

Trade statistics (2019; USD bn)



Top Export Goods (USD bn)[3)]

Oil and minerals[4)]	20.1
Metals	5.6
Chemicals	1.5
Vegetable products	1.3

Top Import Goods (USD bn)[3)]

Machinery/Electrical	3.7
Metals	3.6
Transp. vehicles & parts	2.3
Chemicals	2.2

1) Data for 2019 2) Data for 2020 3) For trade with CHN, RUS, UZB, TUR, ITA, NLD & FRA 4) Includes 14% non-oil related products e.g. salt, earths & stones

Source: CAREC, IMF, OECD, OSJD, UN Comtrade, World Bank, Expert interviews, Press research, Roland Berger

Caspian Sea ferry service significantly limiting expansion of Middle Corridor offering via KAZ

Kazakhstan key rail freight bottlenecks

1. Caspian Sea shipping service limitations – Port closures, small vessel sizes, lack of scheduled services and high shipping rates
2. Strong competitiveness of North Corridor transit reducing attractiveness of developing and investing in Middle/South Corridor for KAZ operators
3. Potential capacity constraints from increase in transport volumes to Caspian Sea facing an ageing rolling stock fleet and critical single track/non-electrified track sections
4. High level of debt for national railway operator KTZ, possibly reducing capability to finance major infrastructure/rolling stock fleet modernization projects
5. Regulatory framework not yet suited to support level playing field competition between private and public operators (e.g., unclear responsibilities, imbalanced charges)

Source: Expert interviews, Press research, Roland Berger

Rail modal share growth as key target for TUR, significant infrastructure investments planned

Turkey (TUR) current status and ambition

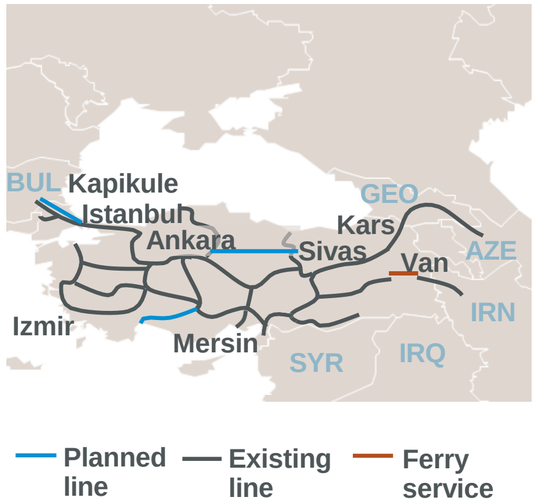
Overview of rail system

Track length (km)

13,022[1)]

Rail tonnage (ton-km m)

15,400[2)]



- Standard gauge rail network, c.46% (6,000 km) of tracks electrified
- Railway liberalization since 2013, TCDD Tasimacilik as largest rail freight operator in TUR
- Baku-Tbilisi-Kars (BTK) line as main link to Middle Corridor, not yet operating at full capacity
- Southern route to IRN via Van Lake ferry and Kapiköy crossing, considered less reliable
- Improved connection to Bulgaria via new Halkali-Kapıkule line to be completed in 2022
- Expansion of dry port terminal capacities key focus under "Transport Vision 2053"
- E-consignment pilot with GEO, AZE and IRN

Modal split

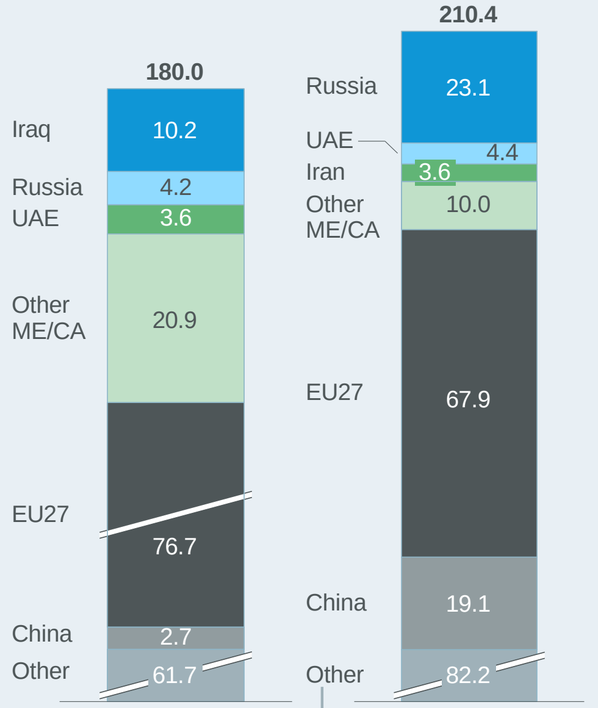
Land freight transport (%)

- Railway system historically not a priority for public investment, increase of competition since liberalization and new long-term financing commitments since 2020 supporting increase of modal share
- Land connection to Middle East only feasible via road transport

Key targets/policies

- Increase modal share of rail freight to 22% by 2053 and expand track network to c.28,500 km
- Increase annual rail freight volume from 55 m tons to 448 m tons
- Transit time reduction to 10 days between CHN-TUR, 1,500 blocks of train per year via BTK line
- Significant increase of capacities for rail terminals in 26 logistics centers planned

Trade statistics (2019; USD bn)



Export

Top Export Goods (USD bn)[3)]

Textiles	9.7
Transp. vehicles & parts	9.0
Metals	5.7
Machinery/Electrical	5.3

Import

Top Import Goods (USD bn)[3)]

Oil and minerals[4)]	17.8
Metals	11.4
Stone/Glass	11.2
Machinery/Electrical	8.3

1) Data from 2021 2) Data from 2020 3) For trade with CHN, IRQ, RUS, UAE, GER, ITA & ESP 4) Includes 1% non-oil related products e.g. salt, earths & stones

Source: IMF, OECD, UN Comtrade, World Bank, Expert interviews, Press research, Roland Berger

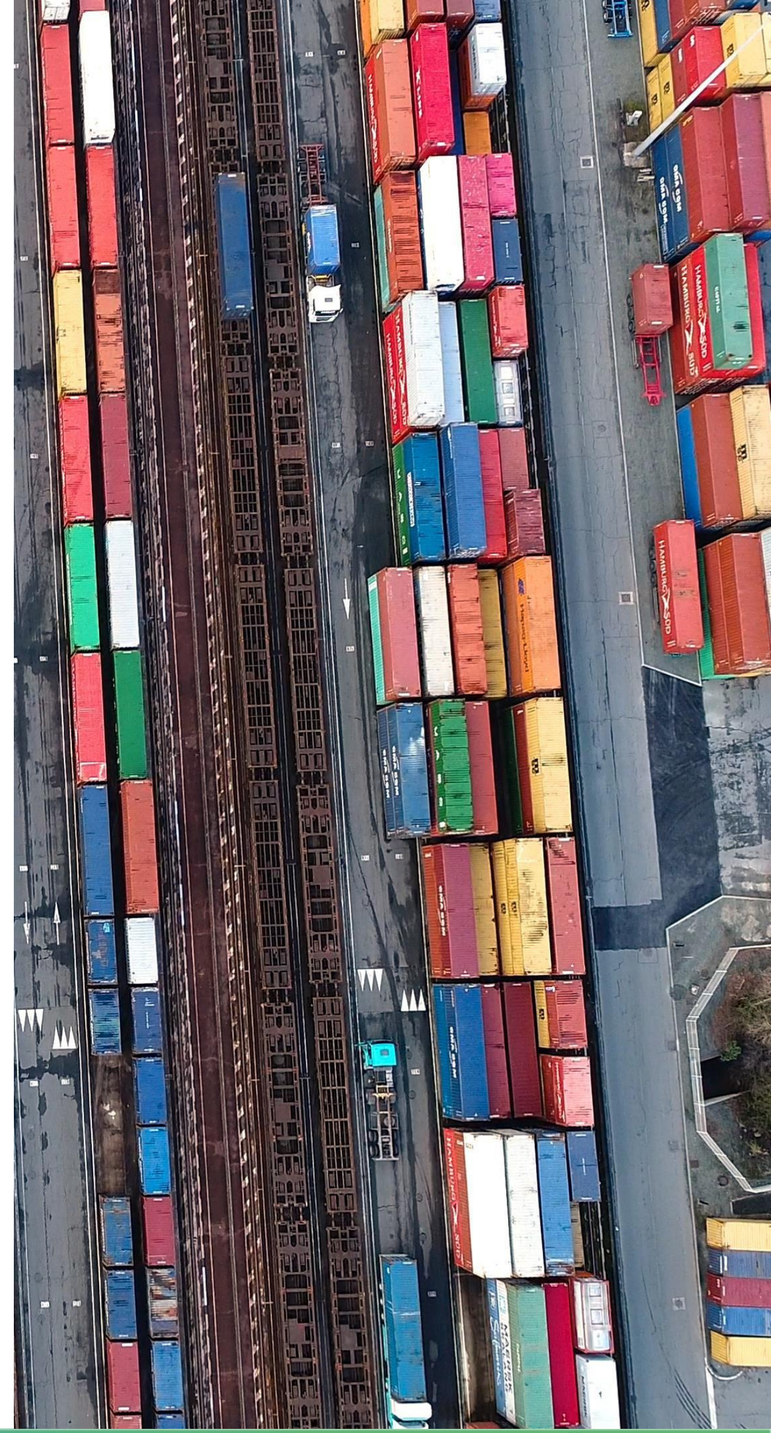
Ageing infrastructure and limited cross-border capacities challenging rail competitiveness

Turkey key rail freight bottlenecks

1. Ageing track and terminal infrastructure with limited freight capacities (mostly small trains) and significant shortage of freight wagons in rolling stock fleet
2. Limited volumes currently feasible via BTK services due to track gauge change capacity bottleneck at GEO border and missing terminal infrastructure/storage space at Kars terminal
3. Harmonized application of electronic CIM/SMGS consignment note still requiring significant coordination efforts with Middle Corridor partners
4. Van Lake crossing as obstacle for South Corridor development due to time-consuming ferry service with high crossing charge
5. Limited experience of freight forwarders with TUR rail system, tariffs lack transparency and operated services not sufficiently promoted in Europe and China

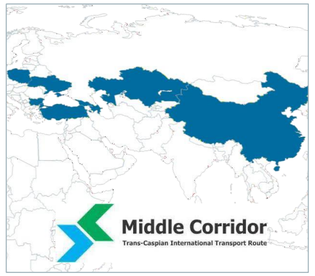
Source: Expert interviews, Press research, Roland Berger

C.3 Excursion: Activities of international rail organizations



International organizations play an important role in the development of rail freight in Central Asia

Overview of selected rail-related international organizations

	Black Sea Economic Cooperation	Central Asian Regional Economic Cooperation Program	Organisation for Cooperation Between Railways	Trans-Caspian International Transport Route	Transport Corridor Europe Caucasus Asia	United Nations Economic Commission for Europe
Members	 *National ministries for economy*	 *National ministries for economy and 7 development financing partners, incl. Asian Development Bank, IMF, World Bank*	 *National transport ministries, railways and 51 affiliated commercial enterprises (primarily rail freight operators)*	 ASCO GR PORT OF BAKU ADY PORT OF ALATAU YB TCDD TAŞIMACILIK Further members incl. port and rail operators	 *National transport ministries*	 *UN secretariat, national government officials and advisors from 56 member countries in Europe, Asia and North America*
Description	• Association to foster regional collaboration across wide range of economic activities • Support for intermodal transport development in early stages, focus mostly on road and sea transport • Activity focus on organization of working groups	• Program to advance multimodal transportation corridors in Central Asia, six corridors in development • Focus on facilitating access to financing, project knowledge sharing, customs process cooperation • Development banks as key partners (e.g., ADB, IsDB)	• Association to support Europe-Asia rail transport (north, middle corridors) • Focus on network expansion coordination, legal harmonization and interoperability facilitation • Comprehensive railway network statistics and project reports	• Association to establish and facilitate Silk Road rail freight services via Caspian route • Supported "Nomad Express" service launch in 2016 • Coordination of interactions between public and private sector partners to improve operability	• Program for the development of multimodal transport corridors between Central Asia and Europe • Rail transport master plan 2026 as action plan guideline for members • Close cooperation with EU development funds, esp. in 2000s and 2010s	• UN regional com-mission, conducts initiatives across broad range of economic fields, rail focus esp. TER network development • In 2010s strong involvement in Middle Corridor via Euro-Asian trade link initiative (EATL) • Mainly operating via working groups

Source: International organizations, Roland Berger

Variation in scope and focus of current rail freight initiatives leaves room for UIC value creation

Evaluation of rail-related initiatives

	BSEC	CAREC	OSJD	Middle Corridor	TRACECA	UNECE
Raising awareness/ creating transparency	• Only internal activities	• Rail sector report, host conferences	• Network statistics, host conferences	• Event participation, political lobbying	• Event participation, political lobbying	• Publications and political lobbying
Harmoni-zation of regulations/ customs	• Focus only on road transport	• Develop cross-border transport agreements	• Devel. and promo-tion of CIM/SMGS	• Cooperation on tariff conditions	• Workshops on CIM/ SMGS consig. note	• Promote use of TIR in intermodal transp.
Facilitation of service operationa-lization	• Focus on improving ferry connections	• Dedicated corridor development plans	• Improve interopera-bility, border crossing	• Increase reliability of modal switching	• Coordinate infra. invest., interoperabi.	• TER network development
Access to institutional partners/ financing	• Limited institutional interaction	• Network of develop. bank partners	• Selected railway organ. partners	• Selected private sector partners	• Cooperation with EU financ. programs	• Cooperation with govern. and NGOs
Process digitization and standar-dization	• Electronic border crossing documents	• General support of rail IT investments	• General support for digitization efforts	• No digitization initiatives	• General support for digitization efforts	• Selected initiatives, e.g., eTIR
Future activity outlook	• No larger rail initia-tives announced	• Comprehensive rail 2030 strategy	• Critical role of RUS as driver of initiatives	• Possible creation of single TITR operator	• Regional focus, e.g., improve ferry ops.	• Focus on Europe, no new EATL phase

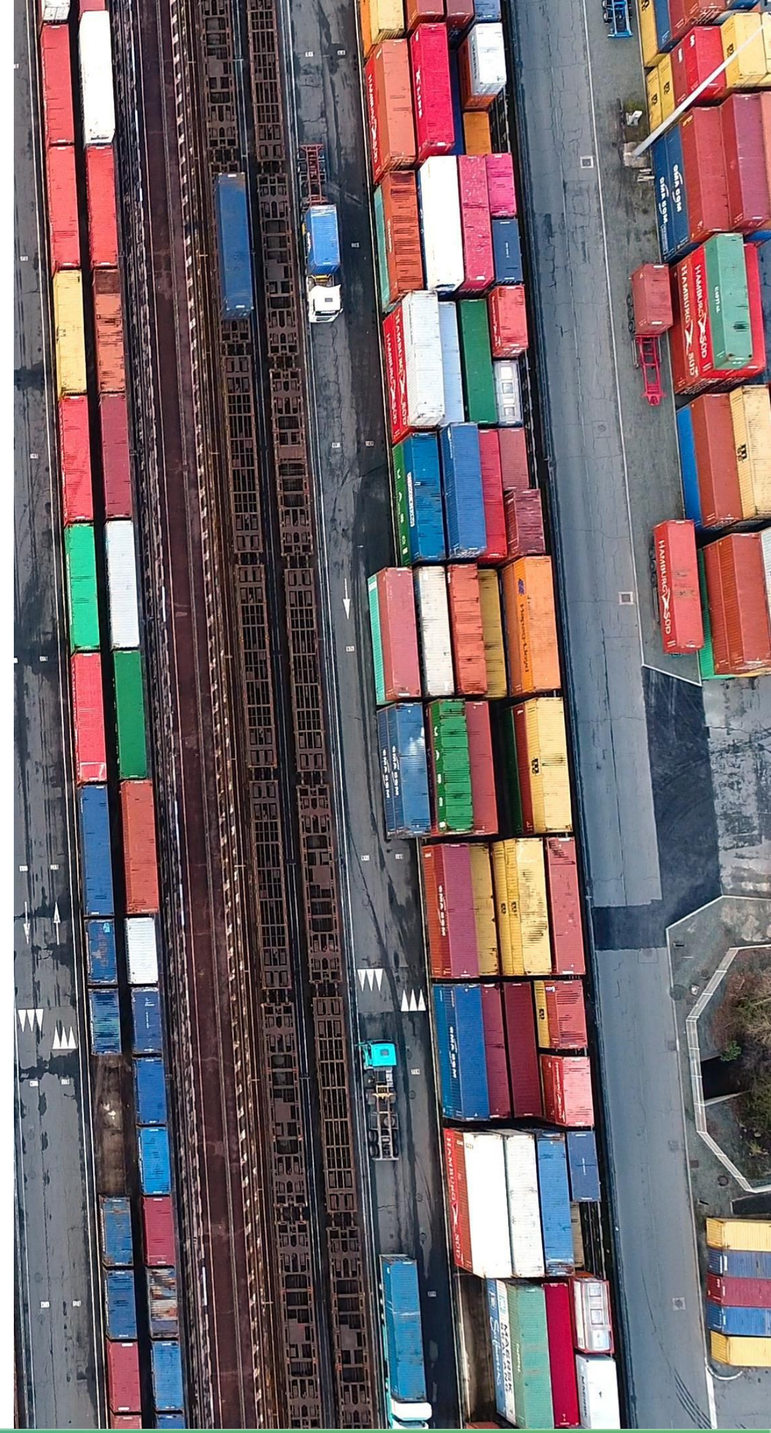
Room for cooperation and differentiation

- Focus of corridor activities mostly on distinct CA/East Europe regions, **overarching integration and involvement of stakeholders** in Middle East, Central and West Europe missing
- Limited **digitalization** efforts, often lack operationalization plan
- Scarce access to potential **public and private sector financing partners** outside of CA region
- Activity scope of OSJD and BSEC potentially negatively impacted by **strong reliance on Russia** for project execution
- Several initiatives with **potential for cooperation** with UIC, e.g., TITR operator, TER – Asia alignment, CAREC rail strategy

Extensive initiatives | Focused initiatives | Absence of initiatives

Source: International organizations, Roland Berger

C.4 Target picture and gap analysis



Further strengthening of Eurasian corridors as key pillars for target picture of CA rail freight

Section overview

1 Vision for rail freight

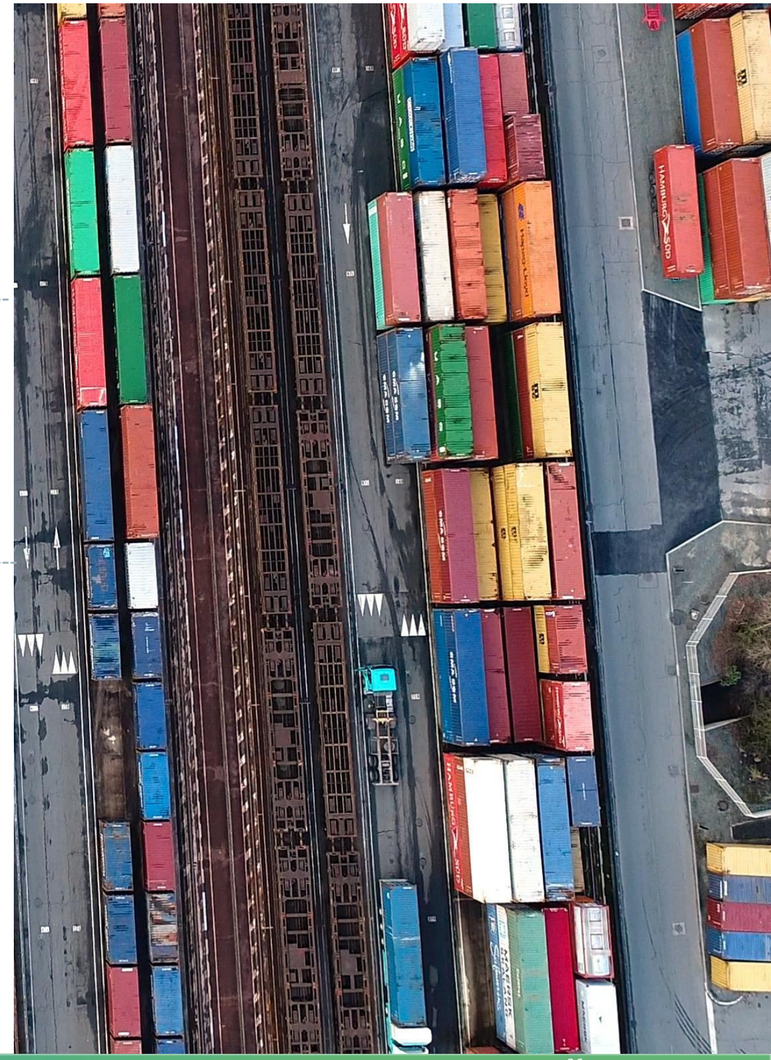
- Combined **target volume of 400,000 TEUs per year** for Middle and South Corridor by 2030 - **No significant deviation from 2021 market forecast expected**
- By 2030, Middle and South Corridor envisioned to be **commercially viable Eurasian rail links**, offering **comparable transit times at similar charges as for North Corridor** with well established service offering

2 Benefits of rail freight

- Developing rail freight expected to deliver **significant economic and environmental benefits** for Central Asia
- Rail freight seen as driver for **sustainability transformation, trade volume growth, advancing logistic networks** and **strengthening rail commercial performance**

3 Rail freight network and service development

- Existing rail network in CA with corridor transit lanes identified**, focus on capacity expansion and building selected new lanes** to bridge current network gaps
- **Improvement of service performance required** regarding transit times, availability, ease of use and balanced demand
- Combination of **process and infrastructure development projects needed** e.g., regarding customs processes and multimodal connectivity
- **High demand potential for rail freight,** e.g., connection to India and South Asia via Iran and natural resource exports from Central Asia



Middle and South Corridor should be well establi-shed and commercially viable Eurasian links by 2030

Vision map 2030

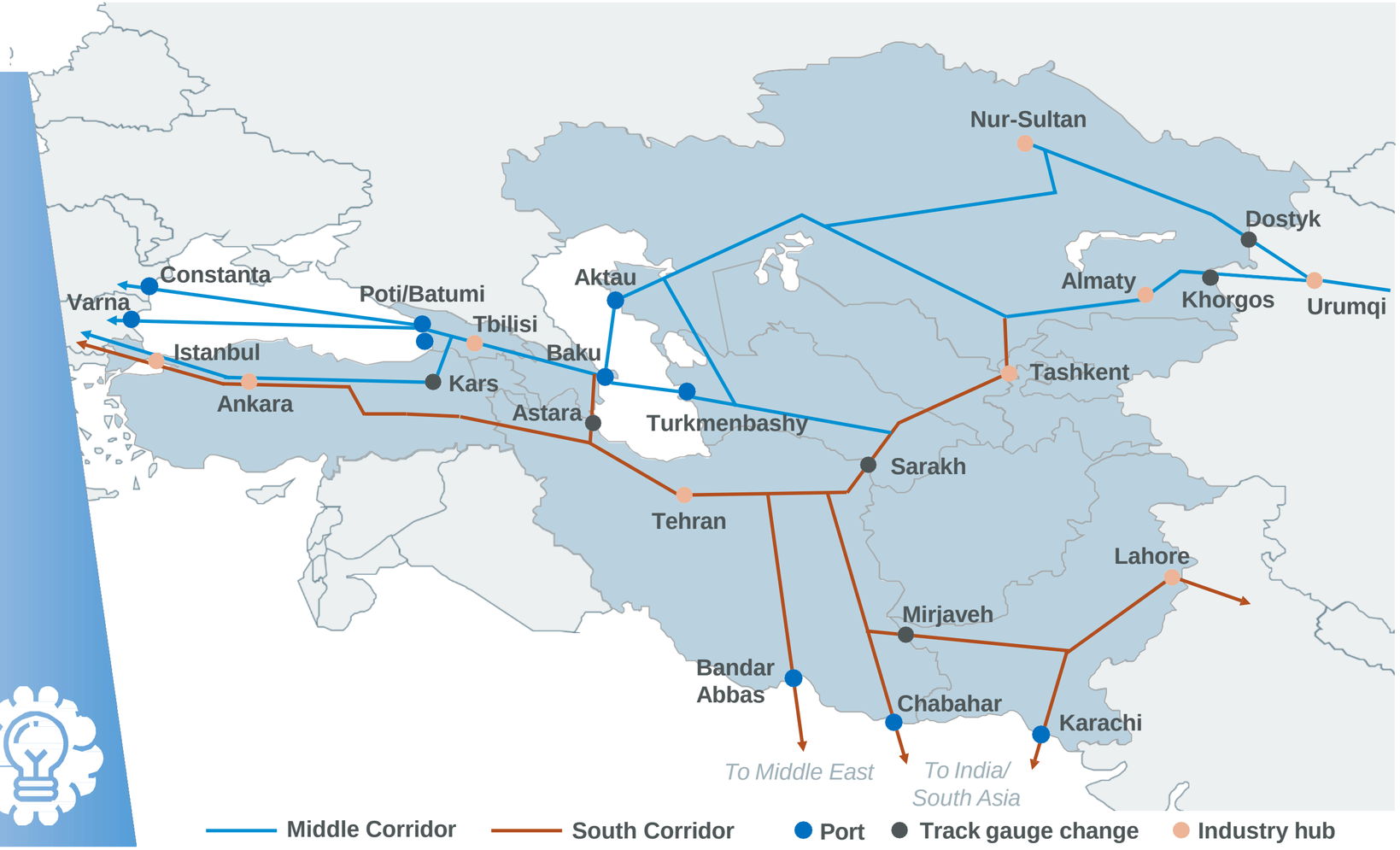
Roland Berger view

Vision for rail freight

400,000 TEUs annual transport volume by 2030 (2021: 29,000)[1)]

Competitive transit times and charges compared to North Corridor

Links to Middle East, India and South Asia established



1) Combined volume for Middle and South Corridor

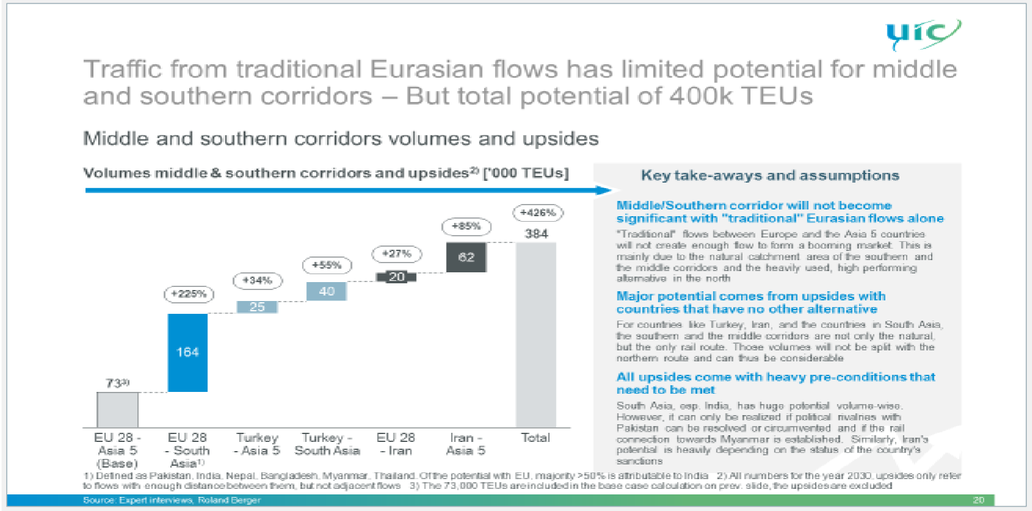
Source: Roland Berger

Volume potential for target state CA corridors expected to remain in range of 400 k TEUs

Rationale for volume targets

Middle/South Corridor volume forecast

2021 UIC study



Main assumptions for volume target:

- Middle/South Corridor will not become significant with "traditional" Eurasian flows alone, establishing rail for natural catchment area in the region also key, e.g., trade links to India and South Asia
- Major upside potential comes from countries that have no other alternative to Middle/South Corridor rail transit like Turkey or Iran
- All upsides come with heavy pre-conditions that need to be met

Rationale for volume target in 2022 study

- **400 k TEUs** still considered realistic **volume upside potential** for Middle/South Corridor rail freight
- **No significant change of underlying trade flows** in natural catchment areas for Middle/South Corridor since 2021
- **No significant change in key capacity bottlenecks** along Middle/South Corridor since 2021
- **North Corridor transit volumes expected to rebound** close to volume forecast from pre-Ukraine crisis due to demand for capacity and unaffected transit operations – **No significant shift of volumes to Middle/South Corridor** in long-term, Middle/South Corridor viewed as complementary to North Corridor

Source: Roland Berger

Developing rail freight in CA provides further attractive economic and environmental benefits

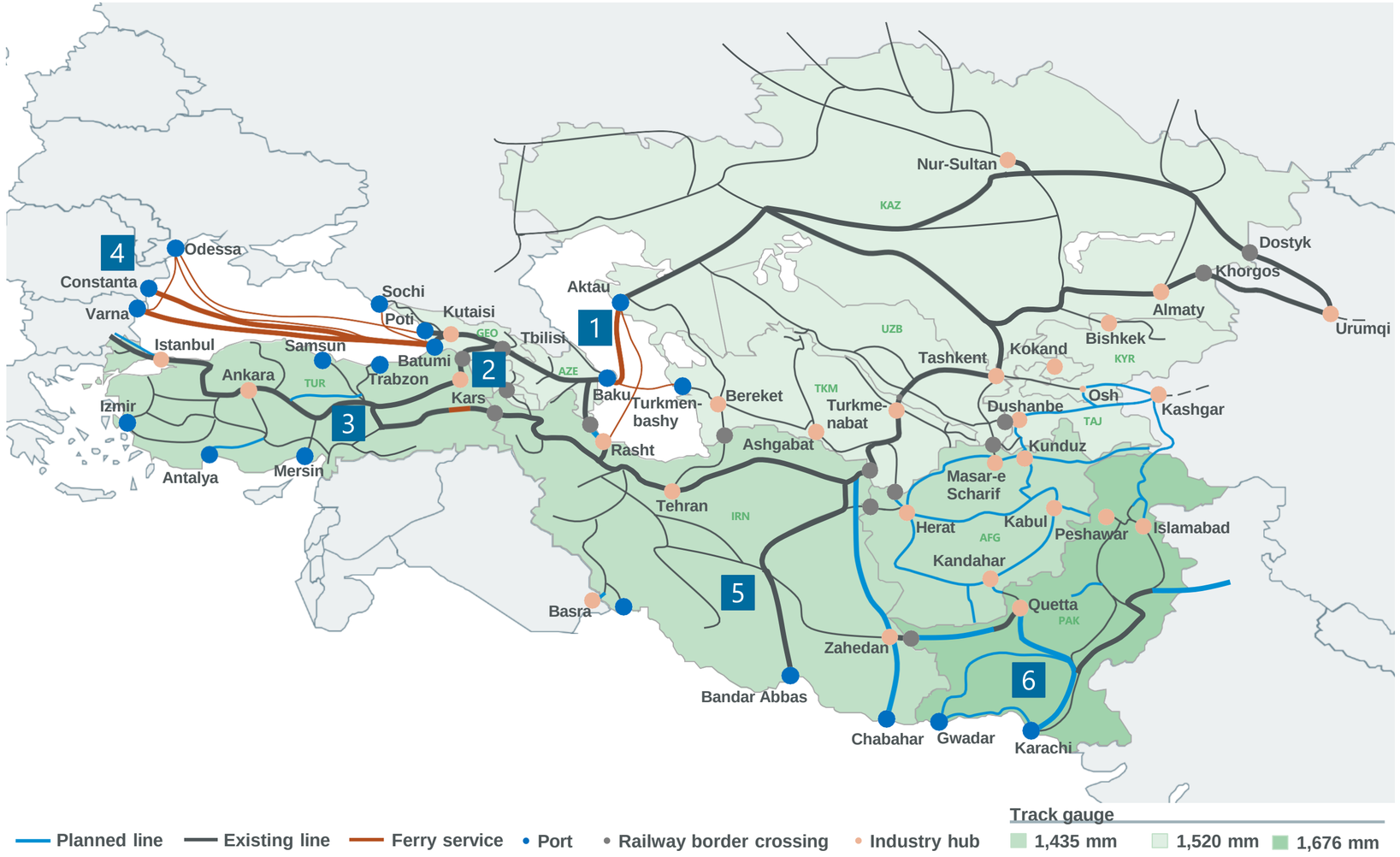
Benefits of rail freight development

- Rail freight as sustainable alternative to road transport
- Complementary solutions to North Corridor required, esp. in current political situation
- Establishing new rail links, e.g., to India, generates new trade opportunities
- Intermodal infrastructure as facilitator of logistic hubs
- Commercially attractive long-distance transit

Source: Roland Berger

Existing rail network as basis for development, focus on modernization and capacity expansion

Central Asia target rail freight network



Key areas of network development

1 Expansion of Caspian Sea connection

E.g., expanding Alat port and ferry capacities and intermodal connectivity

2 Caucasus and Black Sea connectivity improvement

E.g., inland rail terminals with long train capacity and deep-see port for Black Sea

3 Turkey network expansion and modernization

E.g., new inland and port rail terminals, track electrification, BTK capacity increase

4 Southeast Europe network and terminals modernization

E.g., port terminal expansion, new double track lines, improved signaling

5 Iran connectivity and capacity improvement

E.g., finalization Astana-Rasht link, terminal expansion at TUR and TKM border

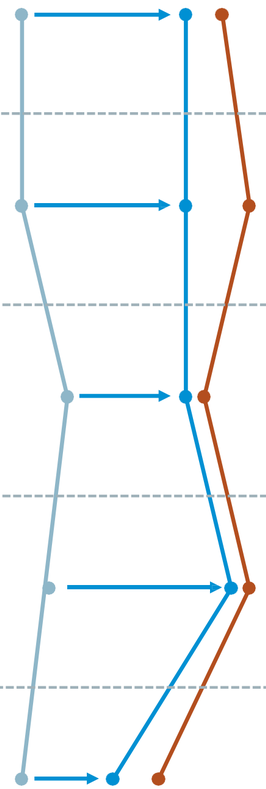
6 New Iran – Central Asia/India transit corridors

E.g., building land bridge to IND via PAK, integrating South Asia via port connections

Source: CAREC, Roland Berger

To achieve target state development goals, addressing of gaps in service offering necessary

Central Asia rail freight target service offering

Parameter	Performance (Low ⟷ High)	Key improvement targets
Transport time		• Significant reduction in transport time required (<30 days for transit), esp. at border crossings and ferry services – Sea freight transport as relevant benchmark transit time • Improvement of transit times for Southeast Europe rail network
Availability		• Increase in number of active operators on Middle Corridor and available scheduled services to eastbound and westbound destinations • Increase in number and capacities of inland terminals for long trains • Expansion of ferry load volumes and port handling/storage capacities
Price		• Reduction of price levels into the price range for North Corridor and sea freight transport • Significant improvement of transparency and reliability of pricing, e.g., via open price indexing
Ease of use		• Harmonized corridor service offering for Asian and European logistics platforms • Regular block trains for containerized transport • Application of standardized regulatory requirements across good types
Balanced flows/demand		• Tap into additional goods supply potentials originating from Central Asia, e.g., LNG rail transports, and integrate new regions into network, e.g., Middle East and India • Open corridor for specialized goods and reduce barriers for bulk good transports, e.g., chemicals

● Status Quo CA ● Ambition Level CA ● North Corridor (Adapted from 2021 evaluation)

Source: Roland Berger

Rail operations require improved processes and infrastructure to bridge current service gaps

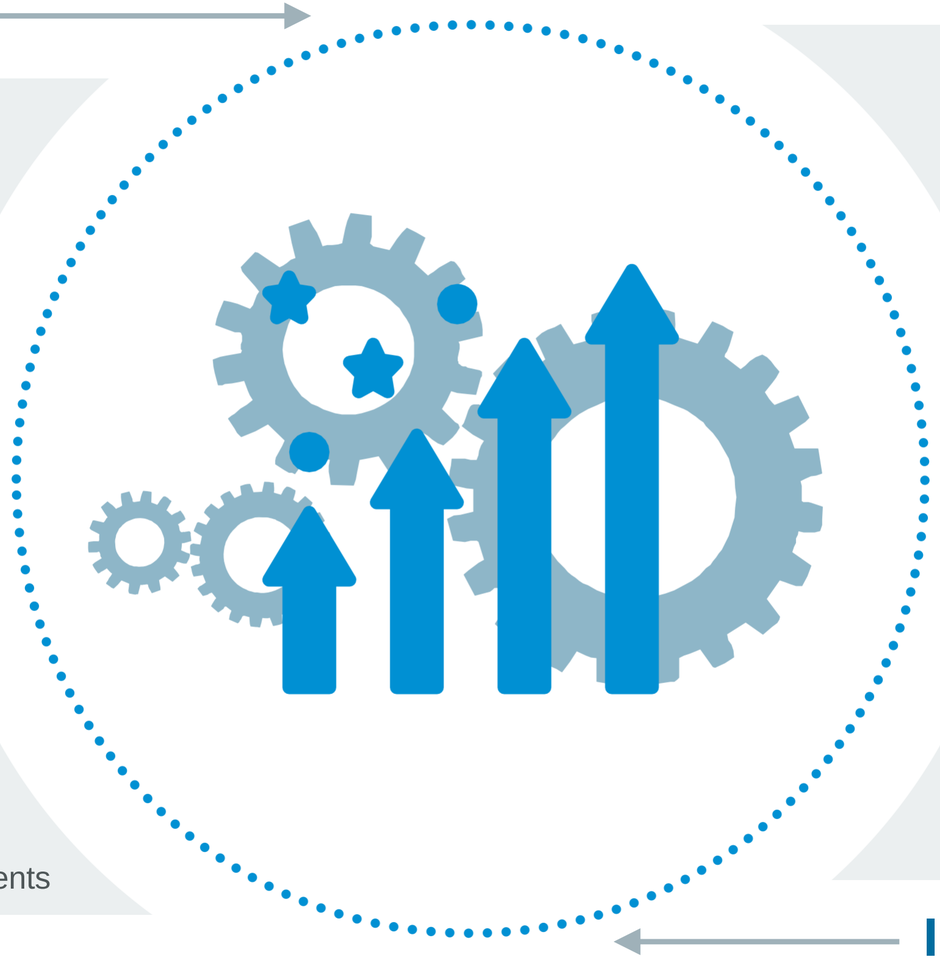
Focus areas for improvement of operations

Process improvement

Customs harmonization
- Unified application of CIM/SMGS across countries, good types and block and wagonload trains
- Pre-arrival customs clearance

Process digitization
- Acceptance of electronic consignment notes
- Digital platform for multi-stake-holder data sharing, e.g. real time shipment monitoring
- Uniform data security standards

Regulation standardization
- Consistent legal requirements for rail transport across good types, incl. special goods
- Simplified regulations for transit shipments



Multimodal connectivity
- Increase of ferry capacities and service reliability
- Seamless integration and expansion of intermodal infrastructure at connection ports

Inland terminal expansion
- Construction of new intermodal dry ports at key corridor points, e.g., Kars
- Expansion of capacities (e.g., bogie supply, track equipment) at gauge change terminals
- Extension of terminals for long trains

Network modernization
- Electrification and installation of automated signaling systems
- Purchase of locomotives and wagons

Infrastructure improvement

Source: Roland Berger

Developing rail freight in CA should aim to tap into attractive growth areas for rail demand

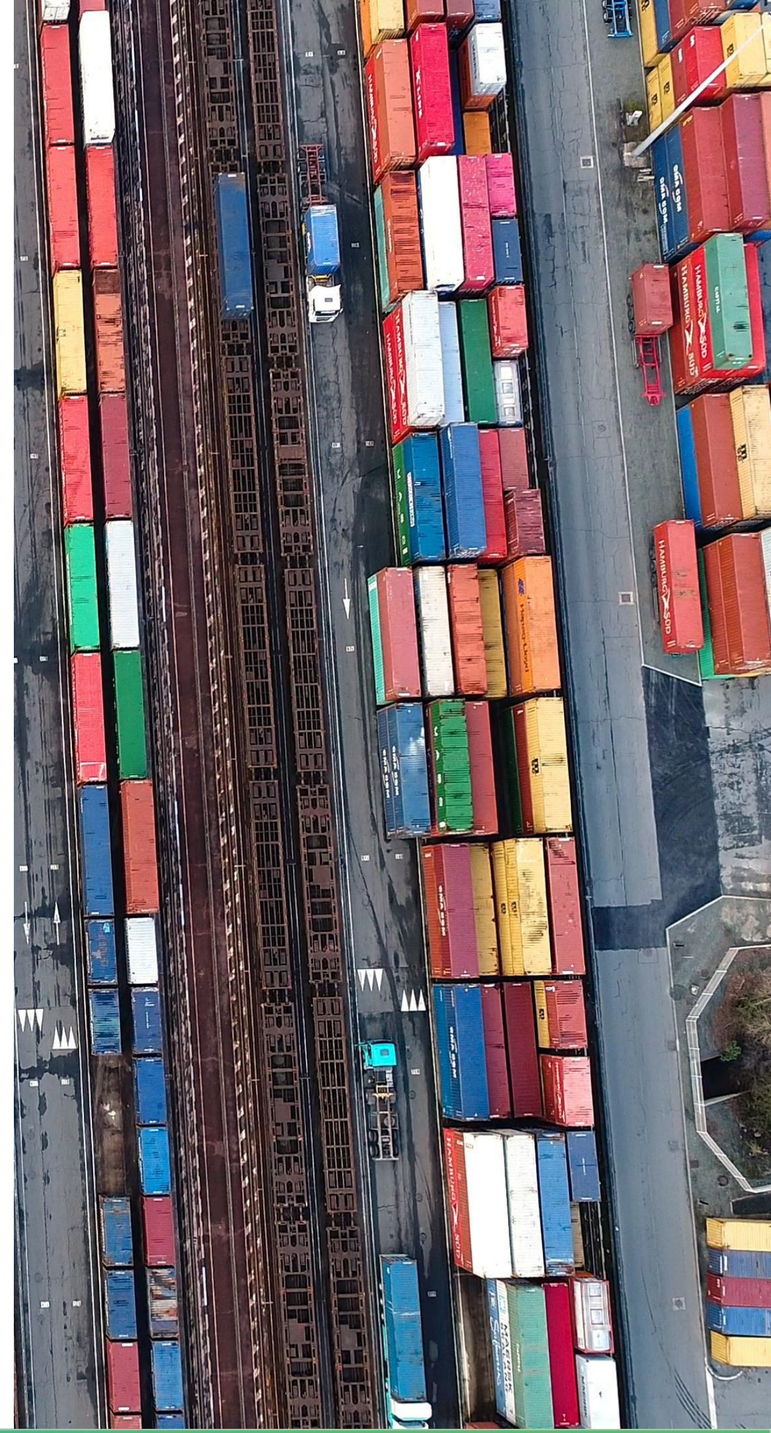
Selected growth areas for Central Asia rail freight demand

Source of demand	Impact on freight volumes	Description
Integration of India and Southeast Asia into Eurasian rail network		• Combined sea and rail transport between Europe and CA to India and Southeast Asia, e.g., via Iran, with estimated potential to generate >250,000 TEUs additional rail freight volume[1)] • Realization not expected before 2030, requires full integration of Iran into Eurasian network and significant expansion of Indian rail network • High potential commercial attractiveness for operators due to long shipment lanes
Establishing South Corridor connection via Iran and Turkey		• South Corridor as attractive land bridge complementation for BRI trade flows to existing Middle Corridor with frequent modal connection breaks • Export of natural resources from Gulf region via combined sea and rail transport as key source of rail freight demand from Middle East via Iran and Turkey • Lifting of sanctions on Iran required, stronger involvement of EU as development partner could speed up realization
Increased export of natural resources from Central Asia to Europe		• Central Asian countries, esp. AZE, TKM and KAZ expected to significantly increase gas shipments to Europe following sanctions on Russia, rail best suited to support volume increase if existing pipeline network reaches capacities • Requires strong increase of tank wagons in existing rolling stock fleets and decoupling of railway operators and lane routing from Russian network • EU as key financing and development partner
Modal shift of regional road freight to rail transport		• Several countries, esp. in Caucasus region and Turkey, with ambitious modal shift targets for land transport • Overall impact considered limited due to inherent competitive advantages of established road freight network on shorter national and cross-border transport • Political support, e.g., via subsidies, can support speed of modal shift

1) Based on 2021 market study assessment, market experts state that volume potential has not significantly changed

Source: Roland Berger

C.5 UIC action modules



CA stakeholders see UIC value in promotion, facilitation, coordination and consolidation

Perception of UIC role for rail freight development

Raise awareness and lobby for key policies and projects

UIC can leverage its broad recognition in the rail industry and political institutions to drive awareness campaigns for key development topics, e.g., strengthen Middle Corridor integrator, promote rail as sustainable transport

"The Middle Corridor is still perceived as exotic, UIC should work to establish a recognizable brand and promote new developments", – **Operator**

Build and facilitate access to networks and knowledge

As globally active organization, UIC is uniquely positioned to build international networks of rail organi-zations and project financing partners and foster know-how development, e.g., via sector reports, feasibility studies or conferences

"Several projects are stalled as there is a lack of experience how to become investment-ready and find financing partners",
– Railway association

Coordinate activities and monitor implementation

A significant challenge for rail freight development is the lack of coordinated efforts across regions and stakeholders – UIC is seen as important organization to bring together governments and commercial parties

"UIC has access to commercial partners which are key to develop commercially viable solutions",
– Railway association

Support standardization and digitization of services

Market participants highlight the need for UIC to drive process harmonization and digitization initiatives, incl. sharing best practices from other regions, e.g., European freight network

"We need UIC to lead consolidation efforts and share best practices, e.g., from EU", – **Operator**

View from market participants

Source: Expert Interviews, Roland Berger

UIC can provide significant value-add potential to develop solutions for key rail freight bottlenecks

Focus areas for UIC support – Central Asia (CA)

Bottlenecks	Key targets for CA rail freight	UIC value-add potential	Possible action modules
Limitations in service capacity and connectivity	• Improve interoperability and intermodal synchronization • Increase reliability, speed and frequency of services (rail, sea) • Increase quality and capacities of rolling stock fleets and key inland/port terminals	▮▮▮▮▮ • Coordination of corridor projects and sharing of operational and technical expertise	• Promotion of benefits arising from improved intermodal connectivity and expansion of terminal capacities • Support design of feasibility studies • Working groups (operators, providers)
Sanctions and geopolitical conflicts	• Integrate Iran in international corridor traffic • Mitigate impact of vested interests on rail development projects	▯▯▯▯▯ • UIC as NGO not positioned to mediate political conflicts beyond rail	• Raise awareness for upside potential of Iran rail integration to open South Corridor
Fragmented and untransparent product offering	• Increase transparency and stability of service prices • Establish readily available services tailored to client needs and raise awareness for service offering • Harmonize and digitize cross-border data exchanges	▮▮▮▮▮ • Promotion of service improvement targets and development of solution frameworks	• Advocate demand for integration and provide resources to TITR/other integration initiatives for execution • Collect and share best practices
Slow progress on key infrastructure projects	• Improve infrastructure and rolling stock project execution time and success rate, esp. for Caspian/Black Sea ports, TUR rail • Secure financing and commitment from public and private sector partners for key projects	▮▮▮▯▯ • Enabling access to financing and development partners and sharing of rail best practices	• Establish cooperation with cross-national initiatives, e.g., CAREC • Collect and share best practices to improve project execution readiness
Addressable demand for rail freight limited	• Increase modal share for natural catchment area and tap into new catchment regions in Europe and Asia • Improve recognition of Middle Corridor and positioning as commercially viable and sustainable transport route	▮▮▮▯▯ • Promotion of service offering and strengthening of corridor positioning	• Support development of corridor representation in East Asia/Europe • Develop strategy for "green" corridor positioning and awareness campaign
Strong competitiveness of North Corridor	• Improve relative competitiveness of Middle Corridor regarding key purchase criteria vis-à-vis North Corridor • Attract freight volumes from North Corridor	▯▯▯▯▯ • Mostly indirect support via other bottleneck initiatives	• Promote available service capacities on Middle Corridor to commercial partner network

▮▮▮▮▮ Extensive potential ▮▮▮▯▯ Focused potential ▯▯▯▯▯ Absence of potential ▭ Prioritized focus area

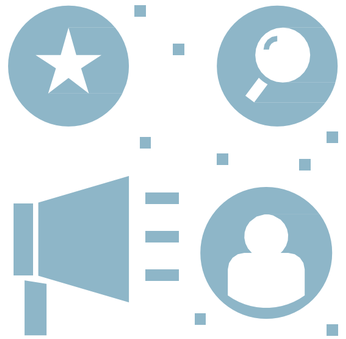
Source: Roland Berger

Stakeholder communication and new CA rail freight group as key pillars for UIC CA action plan

UIC action plan for Central Asia rail freight

I Communication and awareness building

- Communication of overarching vision for CA corridors and gaps to target state
- Promotion of rail as attractive transportation solution to leverage strategic momentum for CA corridors
- Road show with commercial partners, government authorities, international rail organizations and financing institutions to lobby support for key development projects
- Transparency on progress of Central Asia rail initiatives and target achievement



II Establishing Central Asia rail freight group

- Alignment on infrastructure development (e.g., project focus, timelines, development partners, financing requirements, etc.)
- Supporting development of technical regulations and digital governance framework (e.g., data safety standards)
- Promoting commercial transparency and service integration initiatives (e.g., pricing component framework, multimodal operating standards)

UIC as strong voice and facilitator of Central Asia rail freight development

Source: Roland Berger

Tailoring communication key to address relevant stakeholders and increase message impact

Stakeholder communication

Message	Target audience: Financing partners	Govern-ments	Infrastruc. providers	Internat. organiz.	Logistic platforms	Railway assoc.	Communication channel
Vision/ambition level for Central Asian corridors and key gaps of status quo	Moderate	High	High	High	Moderate	High	Rail conferences, government road show, logistic forums, study/news publications
Central Asian corridors as commercially attractive opportunity for railway development	Moderate	High	High	Limited	Limited	High	Rail conferences, study/position paper publications
Support needs in key development projects	High	High	Moderate	High	Limited	Moderate	Rail conferences, rail working groups, development support partners road show
Updates on development projects and target achievement	Moderate	High	High	Moderate	Moderate	High	Rail conferences, rail working groups, study/news publications

High relevance | Moderate relevance | Limited relevance | Deep dive

Source: Roland Berger

To mobilize resources for corridor development, UIC can promote target state 2030 ambitions

Potential UIC action module (1/2)

Communication and awareness building

Target state ambition for Central Asia rail freight

Objective

- Establishing **common vision 2030 for rail freight development** in Central Asia and alignment of views on key gaps for target achievement
- **Mobilizing resource commitments** and **coordination of rail freight development strategies** to bridge gaps and address attractive demand potentials

Key messages

- Target levels for Middle/South Corridor **freight volume growth and service quality improvement** by 2030
- Key development areas for Central Asia **network infrastructure, rolling stock fleets, process harmonization and digitization**, etc.
- Required **investment plans and project timelines** for 2030 target level achievement
- Need for increased **coordination of development efforts** between relevant rail freight stakeholders, e.g., governments, railways, international rail organizations, development financing partners, logistic platforms and commercial operators

Recipients

- Central Asian **governments, railways, infrastructure providers, ferry operators, rail organizations** (e.g., TITR, TRACECA), **development financing partners**
- **European operators and development financing partners** (e.g., EU TEN-T program)
- **Chinese logistic platforms** and regional governments

Format

- Initial **sounding and alignment** of target state view via CA rail freight group experts
- **Conference presentation** during UIC rail freight weeks in November
- Combined Central Asia **government roadshow** with rail organization partners, e.g., TITR, TRACECA

Source: Roland Berger

To establish Turkey as key rail transit hub, UIC can highlight attractiveness of Eurasian corridors

Potential UIC action module (2/2)

Communication and awareness building

Attractiveness of Middle Corridor development for Turkish rail

Objective

- Strengthening **strategic relevance of Middle Corridor** transit freight in Turkish railway sector development planning
- Securing **commitments for further investment** in transit terminal infrastructure, rolling stock capacity and service interoperability to establish Turkey as Middle Corridor rail hub

Key messages

- **Transit volumes** via Middle and South Corridor with **potential for significant growth** to c.400,000 k TEUs by 2030
- Inland **transit via Turkey key** to avoid existing Black Sea capacity bottlenecks at European ports and establish land bridge to South Asia via Iran
- Existing **transit infrastructure** (e.g., Kars terminal) **and rolling stock fleet requiring additional investments** to position Turkey as attractive transit hub for Eurasian rail freight
- International **operators/wagon leasers highly interested in entering Turkish market**, however, current insecurity regarding public commitments to Middle Corridor development limiting stronger commercial involvement
- Middle corridor development as **opportunity to reduce transport emissions** and establish **green transit corridors via Turkey** to achieve national sustainability targets

Recipients

- **National ministries** for transportation and economy
- Representatives from **TCDD and TCDD Taşımacılık**
- Other **public sector development and financing partners**

Format

- Conference **presentation and dedicated roadshow**, e.g., in connection to UIC rail freight awareness weeks in November
- **Position paper** in cooperation with TITR, TRACECA and other relevant international rail development organizations

Source: Roland Berger

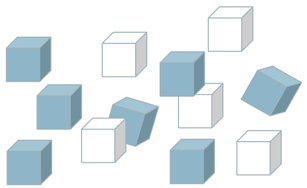
Green sea freight corridor provides potential blueprint for Middle Corridor communication

Excursion: Global Maritime Forum green freight corridors

GLOBAL MARITIME FORUM

Bottlenecks and Targets

- International maritime **shipping responsible for c.3% of total GHG[1] emissions** worldwide
- Currently **lack of zero emission vessels (ZEVs)** in global sea carrier fleets, only limited use of sustainable alternative fuels
- Scalable **infrastructure for decarbonized shipping in very early stages** with limited operationalization
- **Target ambition: Commercially viable ZEVs operating deep sea trade routes by 2030**, reduction of GHG emissions in shipping by 50% until 2050

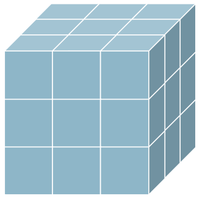


Approach

- **Formation of a broad coalition** of carriers, forwarders, infrastructure providers, governments and NGOs to commit to green shipping targets
- **Identification of international green freight shipping corridors** with commercially viable and replicable operation concepts based on pre-feasibility studies
- Development of **integrated corridor solution concepts** with key partners along entire shipping value chain
- Support in **setting up and steering dedicated project consortia** to advance corridor development

Outcomes

- Green sea freight corridors as **key policy targets** for large maritime organizations, e.g., IMO and WSC
- **Consortium of production industry firms and carriers established** together with Global Maritime Forum to concretize plan for **green freight corridor between East Asia and Australia**
- **Related organizations build on concept** to develop further green freight shipping corridors, e.g., C40 cities
- **Expansion of stakeholder involvement**, e.g., via establishing network of financing partners for green shipping initiatives



Key takeaways

- **Sustainability targets as key motivator** for coordinated industry efforts and driver of awareness for initiatives – Rail corridor development lacks prominent "green" positioning
- **Commercial viability and holistic value chain applicability** critical for promoting operationalization of concepts
- Active **involvement in project consortia** important to **ensure knowledge dissemination and activity coordination** across different initiatives/ stakeholders

1) Greenhouse gas

Source: Global Maritime Forum, Press research, Roland Berger

The proposed CA rail freight group operates in three expert groups with UIC as coordinator

Target operating model Central Asia rail freight group

Central Asia rail freight group
e.g., bi-annual meeting cycle

Regular status update

Target setting and steering

Ad-hoc bilateral cooperation

Expert working groups

Infrastructure and rolling stock

Selected targets

- Action plan for **rolling stock procurement/financing** and optimized wagon operating (e.g., in Turkey)
- Development roadmap for improved **intermodal connectivity and transit capacities** at key sea ports (e.g., Baku) and inland terminals (e.g., Kars, GEO)

Digitization and governance/regulation

- Governance framework for **data exchange and security** across Middle Corridor
- Requirements analysis for **digital customer platform** (e.g., end-to-end shipment tracking)
- Harmonized **technical and operational safety** regulations

Middle Corridor integration

- Increasing **service/ pricing transparency** and develop. of frameworks
- **Multimodal operating** framework, e.g., wagon exchange, dangerous goods
- Roadmap for additional **integration areas** in corridor operations (e.g., via TITR)

Deep dive

Value of UIC

- Comprehensive **in-house expertise on rail operations**, e.g., wagon operating and interoperability, modal connectivity, terminal development
- Access to **broad network of rail and other combined transport partners** in Europe and Asia (e.g., port operators)
- **Neutral actor** to facilitate consolidation and harmonizing of process/data governance and operational standards

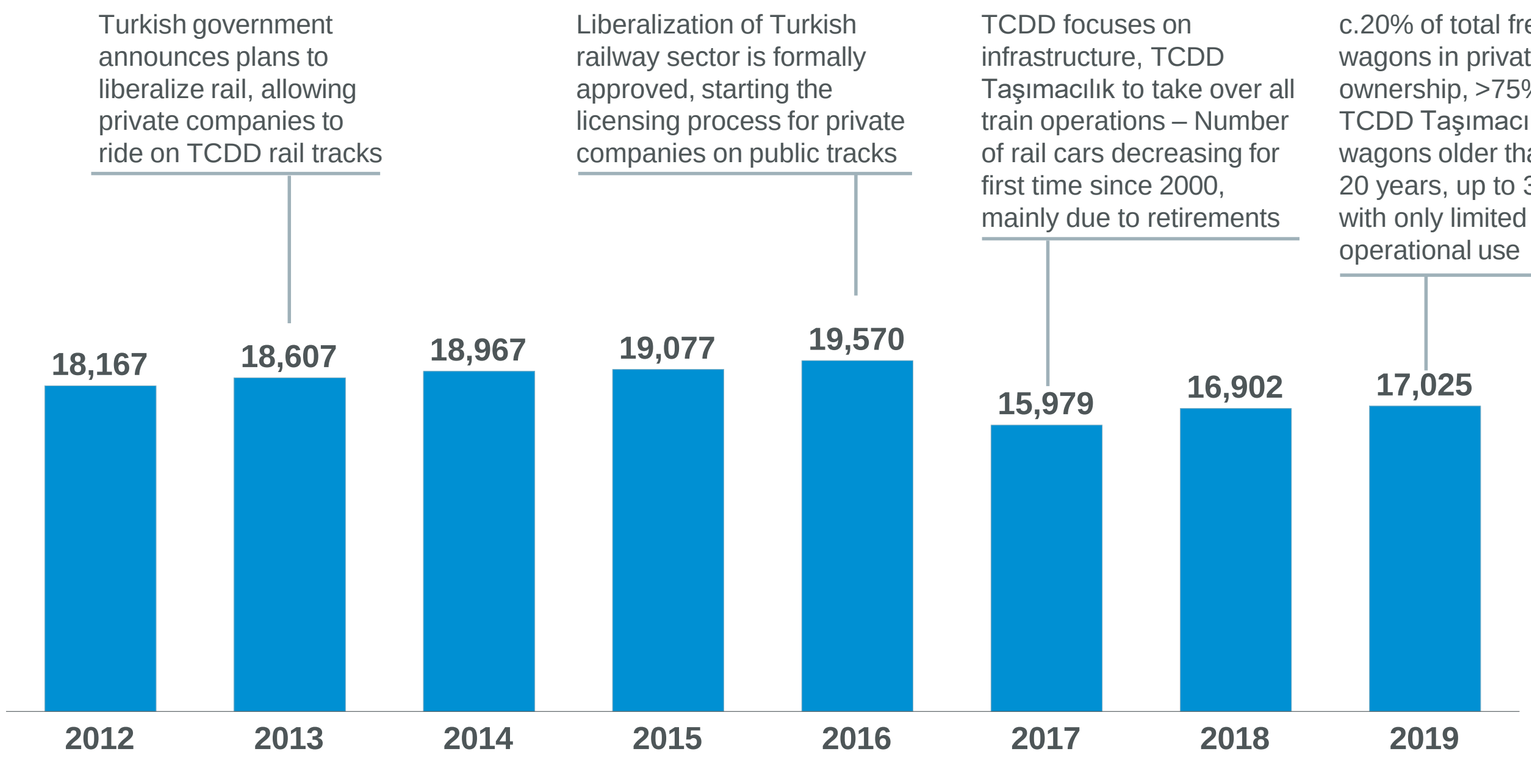
Source: Roland Berger

Turkey needs to invest heavily into rolling stock to satisfy expected demand for corridor traffic

Rolling stock development in Turkey

Central Asia rail freight group

TCDD Taşımacılık goods transport rail wagons [#][1)]



"Turkey will play a key role as hub for Corridor transit, however the current rolling stock capacities in the country do not support the expected volume growth", – **Operator**

"Wagon leasing firms are interested to enter the Turkish market and see attractive growth potential there, however the economic outlook makes long term planning challenging", – **Wagon leasing provider**

Key challenges for rolling stock development

- Overall **wagon fleet size with significant decrease** in recent years, **private operators not capable of filling gap** required to achieve target rail freight volumes
- Large share of **existing rolling stock fleet nearing end of deployment**, maintenance and repair becoming increasingly costly
- **Challenging international procurement of new rolling stock** via purchase or leasing due to devaluation of Turkish Lira and insecurity of wagon providers regarding economic outlook

1) Before 2017 figures reported for TCDD

Source: European Commission, UIC, Expert interviews, Press research, Roland Berger

To increase the fleet of wagons, a corridor pooling model can provide an interesting avenue

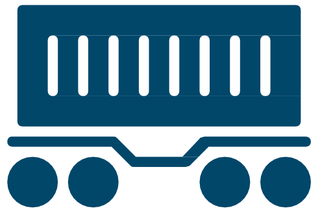
Comparison of international intermodal wagon ownership models

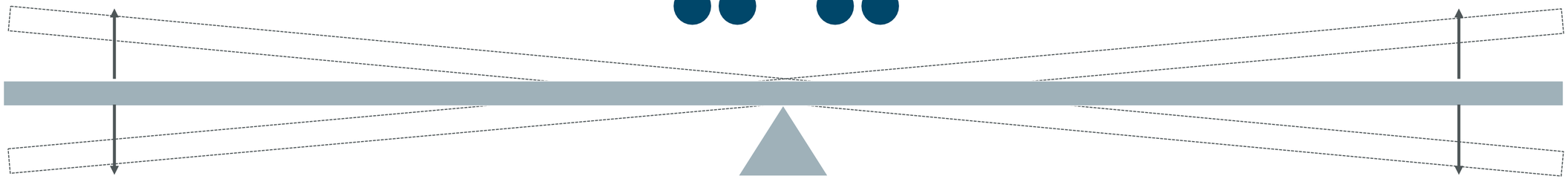
Wagon pooling model

- **Small portion of all intermodal wagons owned by railway associations** in North America
- Majority of intermodal **wagons obtained from cooperative wagon pool managed by TTX** (owned by all Class I railways) – Flexible sourcing of resources possible
- Pooling supports **reduction in idle time**, average daily utilization of wagons >90%
- Model comparable to trucking industry (i.e., trailers typically not owned by trucking associations) – **Wagons viewed as means to an end**

Proprietary ownership model

- In Europe, **wagons owned by multiple parties**:
  - Railway associations (largest proportion)
  - Intermodal operators
  - Leasing and renting companies (in particular for specialized equipment)
- **Wagon pooling challenging** due to different national legal and regulatory requirements
- Wagon **ownership viewed as instrument to achieve competitive edge** over other providers – Ownership allowing full control of assets and offering of integrated transport solutions





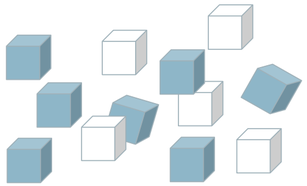
Source: Press research, Roland Berger

IATA freight digitalization initiative highlights key success criteria for rail digitalization programs

Excursion: IATA Digital Cargo/e-freight initiative

Bottlenecks and Targets

- National and cross-border **air cargo handling** as **paper-heavy process** with cumbersome handling and archiving of documents
- **Poor quality of documentation** due to **lack of standardization**, accessibility of relevant data for process stakeholders limited
- **Target ambition**: **end-to-end paperless transportation process** for air cargo through a regulatory framework, electronic messages and high data quality

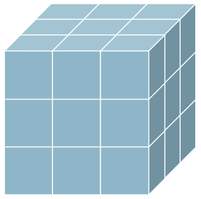


Approach

- Establishment of **dedicated working groups** involving carriers, forwarders, handlers, shippers, custom brokers and customs authorities
- Initial **focus on development of electronic air waybill** incl. adaptation of regulatory framework
- **Phase-wise implementation** of e-Waybill after 2011 along pilot trade lanes for iterative process improvement
- Subsequent **formalization of e-Waybill** as new industry-wide standard by IATA
- Continuous performance evaluation to **monitor adoption success** and bottlenecks

Outcomes

- Since 2019, **e-Waybill is industry standard for air cargo** and used in over 2/3 of shipments
- Data **availability and reporting quality increased** significantly
- Digitalization of cargo documentation serving as **basis for further initiatives**, incl. single record view of shipment information and IoT real-time monitoring of special cargo
- IATA actively pursuing **new industry standards** for data storage, sharing and analysis via working groups, hackathons and other projects



Key takeaways

- Process **standardization and digitization** as key value-adding initiatives for international transport associations
- Involvement of **regulatory and commercial experts** required for solution development
- **Piloting, monitoring and refinement** support solution readiness for industry-wide adoption
- Single initiatives embedded in **overarching strategic development roadmap** to avoid island solutions

Source: IATA, Press research, Roland Berger

Increasing service transparency and stability requires national and commercial integration

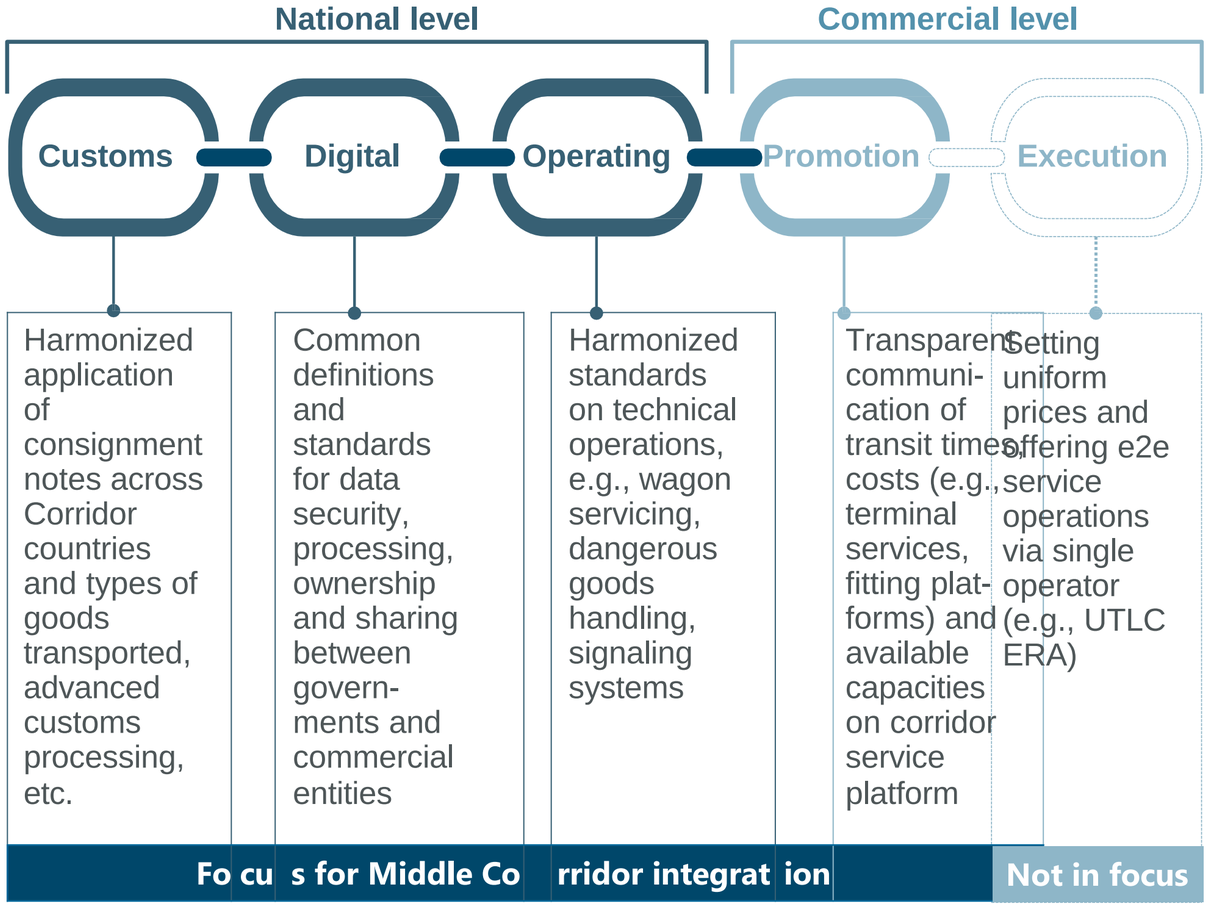
Middle Corridor service integration

Central Asia rail freight group

Status quo Middle Corridor

- **Customs processes, legal and operating requirements differ** between transit countries and good types
- **Lack of overarching digital governance** framework (e.g., definitions, legal and process standards)
- Commercial **service offering perceived as untransparent** and lacking long-term planning horizon

Effective Corridor integration



Learnings from North Corridor

- **Standardization of customs processes** (via customs union) and **legal transit framework** as key successes of corridor **integration on national level**
- Increase of **service offering transparency and coordinated promotion** of corridor capacities essential for **commercial integration**
- **Single operator with pros and cons** – increase in stability, however, decline in competition

Source: Roland Berger

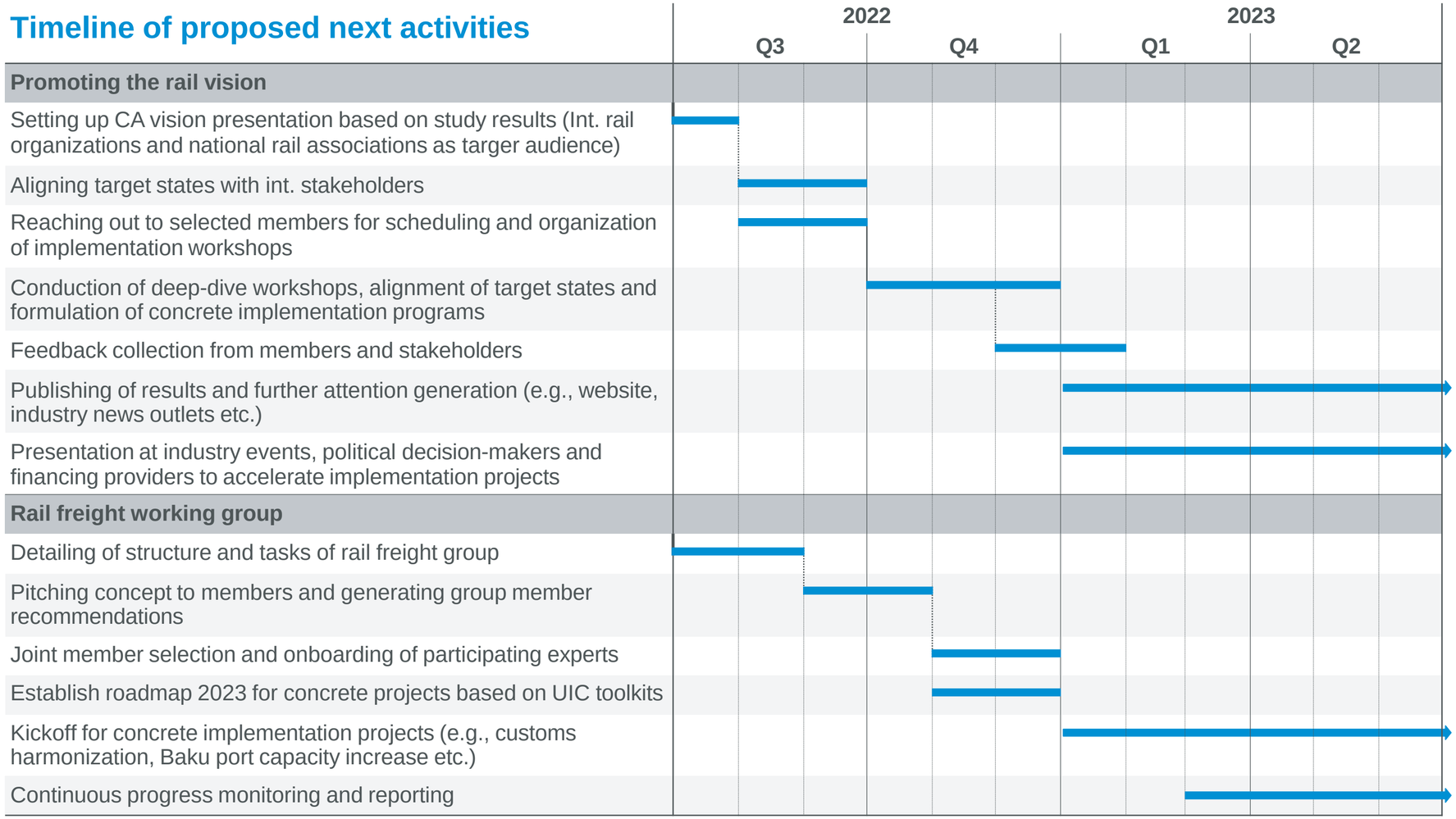
Promoting rail freight vision and establishing rail freight working group as immediate action plan

Immediate UIC action plan

Achievements and starting point

- ✓ **Status quo situation and key bottlenecks assessed**
- ✓ **Target picture of rail freight drafted**
- ✓ **Initial action fields for UIC support developed**

Timeline of proposed next activities



Source: Roland Berger

C. Middle East

D.1 Current status of rail freight

Rail poised for strong expansion in ME – Light-house projects with attractive demand potential

Overview of recent developments

1 Growing demand

- **Current demand limited to public customers** in selected commodities, e.g., sulfur
- **Rail still with minor role** vis-à-vis truck, pipeline and sea transportation due to lack of established rail networks, modal share of rail freight <1%[1)]
- **Commercial demand for rail freight is increasing**, especially for intermodal connections to ports in Gulf region
- **Increasing focus on sustainable transport** as key driver of further rail demand

2 Ambitious policies

- **Extensive national railway development plans** in several ME countries, e.g., "Saudi Vision 2030 for Rail", "Jordan Rail Strategy 2025" and "Iran Network Vision 2036"
- **GCC countries with agreement to significantly increase rail share** to boost regional trade and fight climate change
- **International collaboration and private partner involvement** with growing importance for rail freight development, e.g., Etihad and DB collaboration

3 Progress on light-house projects

- **Operationalization of GCC railway** as most significant railway project in the region – UAE-KSA link expected to open in 2023
- **East-West KSA link** as focus project under Vision 2030 strategy
- Current projects face **challenge of having to create new infrastructure from scratch**, increasing costs and complexity
- **Progress** on rail infrastructure projects **varies significantly between countries**

4 Expansion of services

- Only **few operational services established**, no private operators currently active
- Mostly **specialized service offerings** for one major customer and high degree of individualization
- **Cross-border networks not yet operational,** expected to be bolstered by GCC railway
- **Increasing focus on connecting rail services to port terminals** to tap into major trade flows for ME region

1) Except for TUR and IRN

Source: Expert interviews, Press research, Roland Berger

First rail freight services in ME show potential of large volume transports, esp. for commodities

Selected rail freight services in Middle East

North – South Line

SAR
الشركة السعودية للخطوط الحديدية

Volume
c.16,000 tons/train

Transported goods
Phosphate, Bauxite

Transit time
8h (one-way Riyadh-Qurrayat)

Frequency
Daily

Dammam – Riyadh Line

SAR
الشركة السعودية للخطوط الحديدية

Volume
c.48,250 tons/train

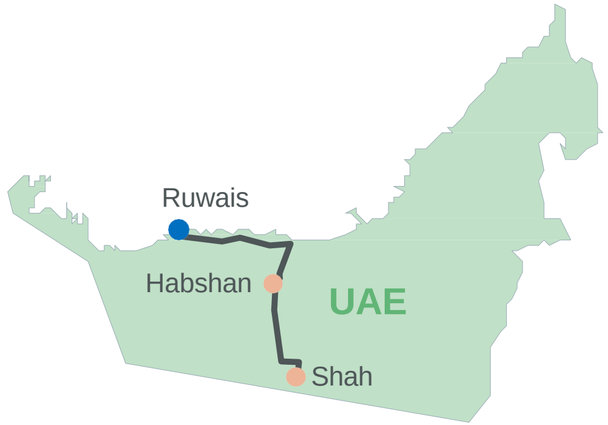
Transported goods
Containers

Transit time
4h (one-way)

Frequency
Daily

Shah - Ruwais Line

الإتحاد للقطارات
ETIHAD RAIL



Volume
c.11,000 tons/train

Transported goods
Sulphur

Transit time
n/a

Frequency
2x daily

● Port ● Industry hub ● Dry port

Source: Etihad Rail, SAR, Expert interviews, Press research, Roland Berger

D.2 Selected country deep-dives (Iraq, Jordan, Saudi-Arabia, UAE, Israel)

ME rail freight faces significant challenges for national and cross-border network development

Key Middle East rail development bottlenecks

Lack of infra-structure (tracks, terminals, etc.)

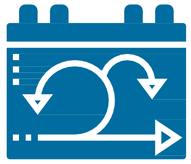
- Rail network and fleet expansion historically not a priority for governments, relevant trade routes often lack rail track connections requiring costly building of new lanes from scratch
- Intermodal terminals at ports for hinterland transport connection often missing
- Lack of operational cross-border rail networks

Insufficient financing for investments

- Large-scale investments required to modernize rail freight network and increase capacity and reliability
- Limited government budgets due to economic and political instability
- Private sector and international financing partners reluctant to participate in projects

Inexperienced project manag. and political instability

- Rail development projects often stalled after initial feasibility studies, esp. cross-border
- Unclear responsi-bilities and inefficient coordi-nation between public development authorities
- Frequent geopolitical crises with negative impact on long-term projects



Limited regional development coordination

- Customs and consignment processes, legal and technical standards lack regional harmonization
- Erratic behavior regarding project execution, e.g., sudden stop of construction activities in cross-border development
- Lack of dedicated cooperation platforms for rail networks

General competitive environment

Strong competitive pressure from road transport

- Road freight system well established and integrated into logistics networks
- Fuel prices often strongly subsidized, increasing road cost competitiveness
- Rail transport perceived as less reliable and available in general public and industry

International trade based on sea and pipelines

- Export trade dominated by oil and gas-related products primarily transported via extensive pipeline network and LNG sea carriers, difficult to address for rail freight networks
- Sea transport strongly incentivized for imports and re-exports via free trade zones connected to major ports (e.g., Jebel Ali Economic Zone)

Source: Roland Berger

Still, market experts agree that rail development is gaining strategic momentum in Middle East

Selected expert statements

"Most problems regarding network connections and cross-border traffic are of political nature – not technological",
- Rail association

"A legal framework and standardized customs process for cross-border rail is yet to be established in Middle East, learning from Europe and the Silk Road will be very helpful",
- Operator

"The increased focus on rail transportation is easy to observe – There is a multitude of projects that are being worked on as we speak", **- Rail association**

"Especially the countries outside the Gulf region need more support to find financing partners for rail infrastructure projects", **- Rail association**

"Exciting times are coming – Rail transport has finally made it into the minds of the Middle East governments. Establishing intermodal logistics networks is now a key priority here",
- Operator

"Our operational and data processing technology needs to be aligned much better for successful commercialization of rail networks: There are very different standards between countries lying farther apart but even within the GCC region",
- Rail association

"We expect the sanction issues with Iran to be resolved in the upcoming years – This would significantly ease up regional project development",
- Operator

"We need to work on aligning customs and legislations better – Our management is spending half of their working time to meet other countries to solve very minor issues",
- Operator

"Several Middle East countries aim to be carbon neutral by 2050 – This will further accelerate the development of the rail transportation sector",
- Forwarder

"Rail project concepts are available everywhere, however actual realization is often years away – lack of know-how and funding is the problem outside the GCC states",
- Rail association

Source: Expert interviews, Roland Berger

IRQ rail network deteriorated in 2010s, rebuilding track system and cross-border links as priority

Iraq (IRQ) current status and ambition

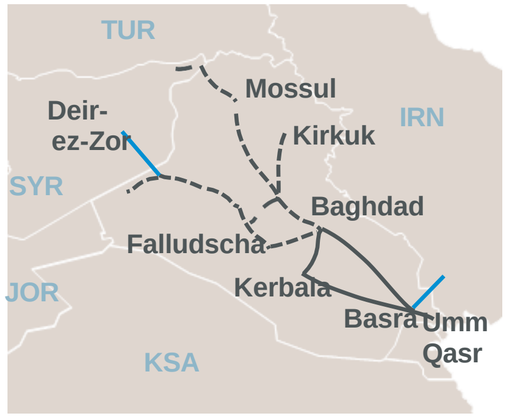
Overview of rail system

Track length (km)

c.2,400[1)]

Rail tonnage (ton-km m)

249[1)]



- Deterioration of railway infrastructure in last decades due to war and political instability
- Investment in transportation infrastructure not a priority for past government development plans, national railway with limited financing capacity
- Cross-border link only with Syria, border crossing to Iran from Basra planned for 2024, Jordan border crossing in review
- Key intermodal terminal at Umm Qasr port, other rail freight terminals at Basra and Baghdad, lack modern equipment and only limited capacities

Modal split

Land freight transport (%)

Rail <5%

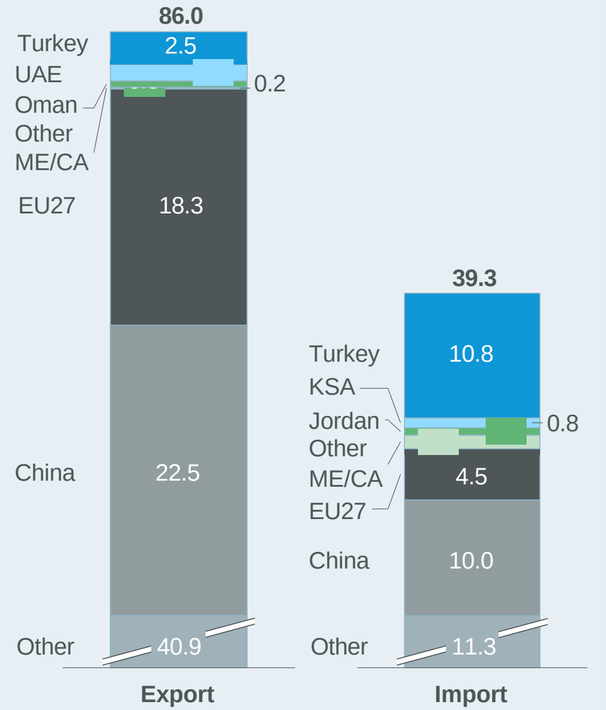
Road >95%

- Baghdad-Basra-Umm Qasr as key rail freight transport route, only few weekly services available
- Kurdish northeast and west IRQ without reliable rail infrastructure
- Land freight trade with Turkey, KSA, Jordan only via road

Key targets/policies

- Establishment of a Euro-Gulf route connecting IRQ with Turkey, Kuwait and KSA
- Modernization of infrastructure, incl. new intermodal terminals and rolling stock
- Reactivation of regular services between Baghdad and northern/west IRQ, new connections to Syria and Iran

Trade statistics (2019; USD bn)



Top Export Goods (USD bn)[3)]

Oil and minerals[5)]	87.5
Raw Hides & Leather	< 0.1
Animals	< 0.1

Top Import Goods (USD bn)[4)]

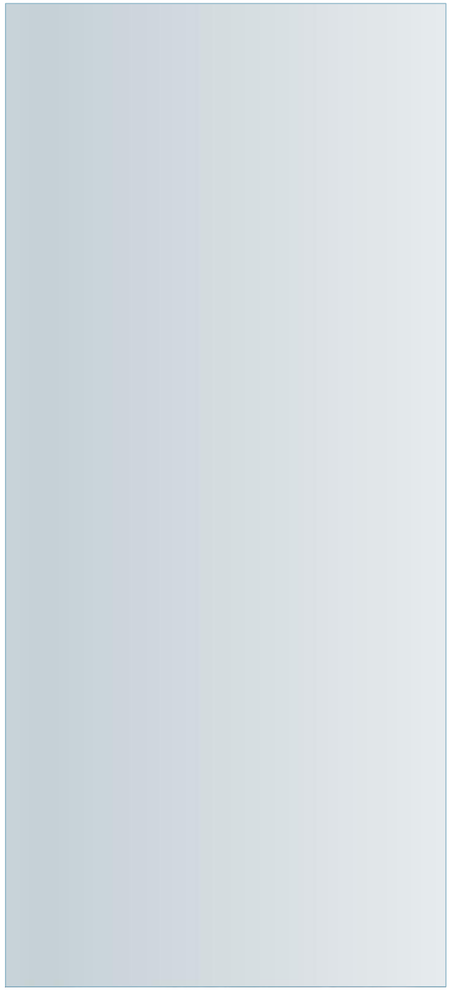
Metals	20.7
Oil and minerals[6)]	19.2
Transp. vehicles & parts	9.9
Machinery/Electrical	4.9

1) Data from 2014 2) Data from 2010; according to expert assessment, no significant changes expected 3) Worldwide exports from 2016, not comparable
4) Worldwide exports from 2014, not comparable 5) 100 % oils and fuels 6) Includes 11.8 % non-oil related products e.g. salt, earths & stones

Source: IMF, ITA, UN Comtrade, World Bank, Expert interviews, Press research, Roland Berger

Political instability, financing gaps and slow project execution limit rail freight development

Iraq key rail freight bottlenecks



1. Depleted rail infrastructure with only limited operability in large parts of the country in need of extensive rebuilding or renovation
2. Scarce financial resources of public authorities, significant infrastructure investments required
3. Persisting political instability, limited cooperation between Kurdish and Central Iraq governments
4. Slow project execution in key roles, e.g., significant delays regarding Iran-Iraq border crossing
5. Only loose interaction with key regional and corridor partners on coordination of rail freight development

Source: Expert interviews, Press research, Roland Berger

JOR is planning to build a new cross-country rail freight network with links to KSA, SYR and IRQ

Jordan (JOR) current status and ambition

Overview of rail system

Track length (km)

c.300

Rail tonnage (ton-km m)

344[1)]

- Limited small gauge freight transportation between Al-Abyad and Aqaba, no freight transport between Amman and Syrian border, only passenger service
- Broad new standard gauge rail network planned to connect Aqaba, Amman and in later phase also border countries
- Significant delay of network construction, KSA as new financing partner for selected routes since 2019
- New intermodal terminal at Aqaba port and major dry terminals at Ma'an and Amman planned

Modal split

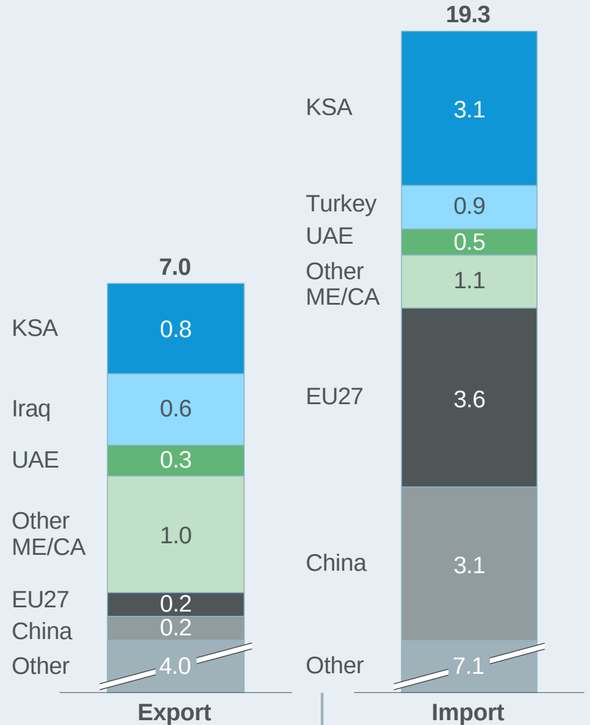
Land freight transport (%)

- Majority of freight transport is conducted via truck, rail network with very limited capacity
- Missing cross-border freight rail network and no direct connection between Aqaba port and major industry center at Amman

Key targets/policies

- Four-phase development plan for new standard gauge rail freight network (>1,000 km) under national railway strategy
- Direct railway link between Aqaba and Amman to increase rail freight volumes by >5%
- Establishment of cross-border rail links to Iraq, Syria, and KSA

Trade statistics (2019; USD bn)



Top Export Goods (USD bn)[2)]

Chemicals	0.8
Vegetable products	0.2
Foodstuffs	0.2
Stone/Glass	0.1

Top Import Goods (USD bn)[2)]

Oil and minerals [3)]	2.1
Machinery/Electrical	0.9
Textiles	0.9
Chemicals	0.9

1) Data from 2010; according to expert assessment, no significant changes expected
2) For trade with CHN, KSA, IRQ, TUR, NLD, ITA, GER & FRA
3) Includes 3.2 % non-oil related products e.g. salt, earths & stones

Source: IMF, UN Comtrade, World Bank, Expert interviews, Press research, Roland Berger

Significant rail investments required, project coordination and financing are key challenges

Jordan key rail freight bottlenecks

1. Very limited rail infrastructure capacity and rolling stock availability, existing network small gauge, Aqaba port not connected to hinterland rail
2. Significant financing difficulties for public projects, scarce involvement of private sector development partners
3. Political instability in neighboring countries (Syria, Iraq) increases difficulty of cross-border project development and reduces demand for freight transport
4. Coordination and resource sharing between national railway providers (Hejaz, ARC) and port/terminal operators challenging
5. Rail transport perceived as unreliable by public and industry firms, trucks dominate modal transport

Source: Expert interviews, Press research, Roland Berger

KSA is conducting large investments to improve modal split on key inland and GCC trade routes

Saudi Arabia (KSA) current status and ambition

Overview of rail system

Track length (km)

c.3,000

Rail tonnage (ton-km m)

c.2,900[1)]

- Saudi Railways as national rail provider for all overland lines
- Three main railway lines: North-South line (2,750 km), Riyadh-Dammam and high-speed railway along West Coast (passenger transport)
- Major infrastructure projects incl. GCC rail to connect KSA with GCC countries, border crossing to Jordan and east-west KSA connection (Jeddah-Riyadh-Dammam-Jubail)
- Large rail terminals currently in Riyadh and Dammam port, smaller north terminals for minerals, Jubail port intermodal terminal under construction

Modal split

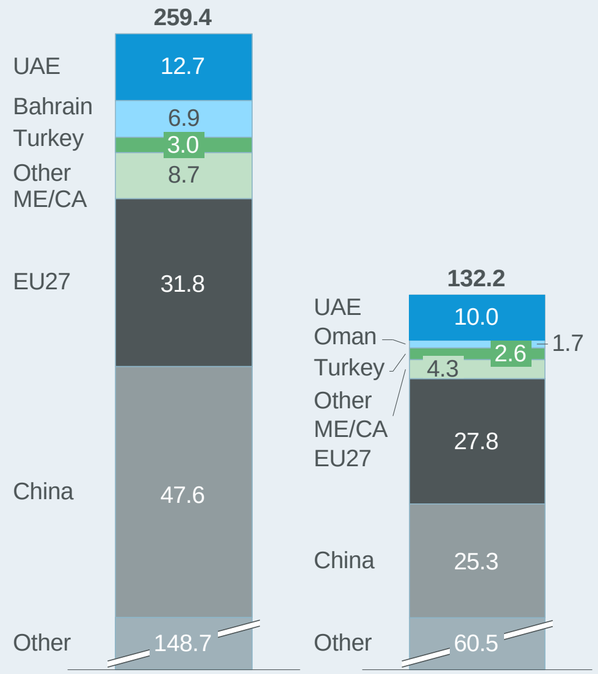
Land freight transport (%)

- Large share of inbound/outbound freight moves via ports, currently only Dammam connected to railway, rail share will increase when Jubail connection opens
- Connection of east and west coast industry centers only feasible via ship or truck

Key targets/policies

- >5,000 km of additional tracks for rail network in the Vision 2030 program to double existing capacity for rail freight
- East-west rail connection to increase modal share of rail to >10% on respective routes and improve travel time and sustainability
- Significant increase of private sector investment in rail freight development to bridge financing gaps

Trade statistics (2019; USD bn)



Top 3 Export Segments

Chemicals	9.0
Plastics/Rubbers	6.9
Metals	0.9
Animals	0.7

Top 3 Import Segments

Machinery/Electrical	8.2
Metals	6.5
Transp. vehicles & parts	6.2
Chemicals	5.2

1) Expert estimate
2) For trade with BAH, CHN, TUR, NLD, BEL, ESP, GER, FRA, ITA

Source: IMF, ITA, UN Comtrade, World Bank, Expert interviews, Press research, Roland Berger

KSA lacks rail infrastructure to connect to ports and GCC partners – Projects very time-consuming

Saudi Arabia key rail freight bottlenecks

1. Limited inland rail track and dry port terminal infrastructure, rolling stock capacities restricted to selected North-South services and to East coast ports
2. Several large ports as major gateways for freight transport are not yet connected to hinterland rail system
3. Road transport has competitive advantages via subsidized fuel prices and broad highway network
4. Key rail projects are very time consuming with sharp cost increases and financing gaps, e.g., east-west connection and GCC railway
5. Lack of cross-border rail crossings to establish integrated freight corridors

Source: Expert interviews, Press research, Roland Berger

UAE aims to expand rail modal share significantly by 2035 via extensive new national rail network

United Arab Emirates (UAE) current status and ambition

Overview of rail system

Track length (km)

c.660

Rail tonnage (ton-km m)

c.1,500

Planned line

Existing line

- Etihad Rail responsible for national development of rail network since 2009
- Since 2016, dual track system (standard gauge) for sulphur transport between Shah/Habshan to export port in Ruwais (7 locomotives and 240 hopper wagons)
- Continuous expansion of rail freight network planned to connect major industry cities and ports, Abu Dhabi – Dubai completed in March 2022
- Project development with international JVs, incl. Chinese and Korean organizations
- 7 major intermodal terminals planned, incl. at Abu Dhabi and Dubai industrial cities and at Khalifa and Jebel Ali ports

Modal split

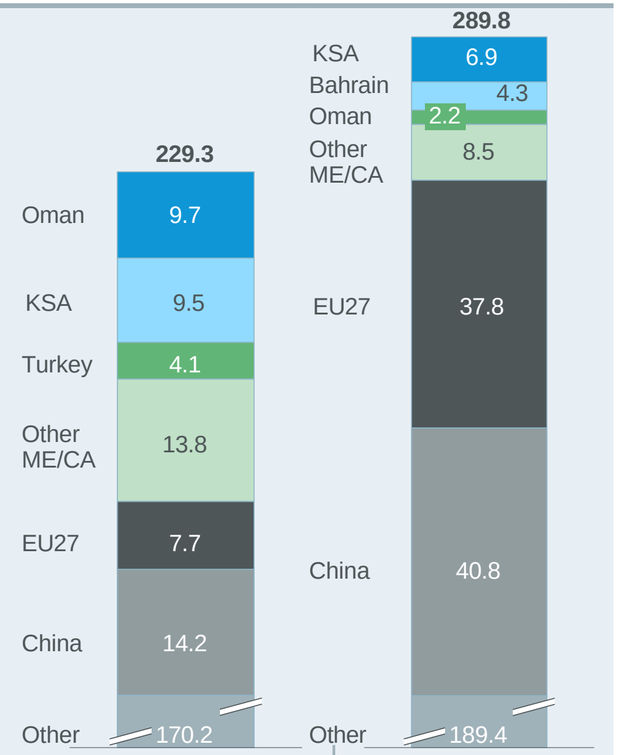
Land freight transport (%)

- Inland freight dominated by road transport, very limited public investment in rail infrastructure before 2010s
- Increase of modal share for rail as key transportation policy target for 2035, esp. link to GCC and main UAE industry cities and ports

Key targets/policies

- Increase modal share of rail to c.30% by 2035 for national and GCC land-based freight transport
- 1,500 TEUs as total annual tonnage target for rail freight by 2035
- Rolling stock capacity expansion (e.g., 38 new locomotives for Etihad Rail)
- Operationalize GCC railway network
- Launch passenger rail service on existing rail network, esp. Abu Dhabi - Dubai

Trade statistics (2019; USD bn)



Export

Top Export Goods (USD bn)[1]

Stone/Glass	7.5
Machinery/Electrical	6.8
Transp. vehicles & parts	6.1
Metals	5.2

Import

Top Import Goods (USD bn)[1]

Machinery/Electrical	11.8
Oil and minerals [2]	11.2
Metals	6.0
Chemicals	5.6

1) For trade with CHN, KSA, TUR, OMN, GER, ITA, ESP & FRA
2) Includes 13.1 % non-oil related products e.g. salt, earths & stones

Source: IMF, UN Comtrade, World Bank, Expert interviews, Press research, Roland Berger

Road transport dominates UAE freight networks, cross-border development via GCC challenging

United Arab Emirates key rail freight bottlenecks

1. Rail transportation non-existent until 2016, logistic networks rely heavily on road transport with well established highway systems
2. Rail freight terminals still under construction, large ports only connected to road hinterland transport
3. Challenging coordination in GCC rail network development with significant project delays in partner countries, e.g., Oman
4. Adoption of rail freight currently only by national companies, private sector requires competitive rates and reliable capacity provision
5. Labor intensive and costly expansion of rail network, e.g., due to extreme temperatures and mountainous terrain in east UAE

Source: Expert interviews, Press research, Roland Berger

Rail plays a minor role for cargo transport in ISR, yet government seeking to increase modal share

Israel (ISR) current status and ambition

Overview of rail system

Track length (km)

c.1,600

Rail tonnage (ton-km m)

c.1,240

Planned line

Existing line

- Standard gauge (1,435 mm) network with focus on passenger train services, rail freight mostly restricted to night times for operations
- Rail freight operated entirely by state-owned Israel Railways
- For geopolitical reasons, ISR only with limited trade with neighboring countries and no cross-border rail networks
- Main goods transported via rail connected to imports/exports via Haifa and Ashdod ports
- Few industrial sites (e.g., steel plants, stone quarries) directly connected to rail network, rail terminal infrastructure limited to selected inland hubs, e.g., Kiryat Gat

Modal split

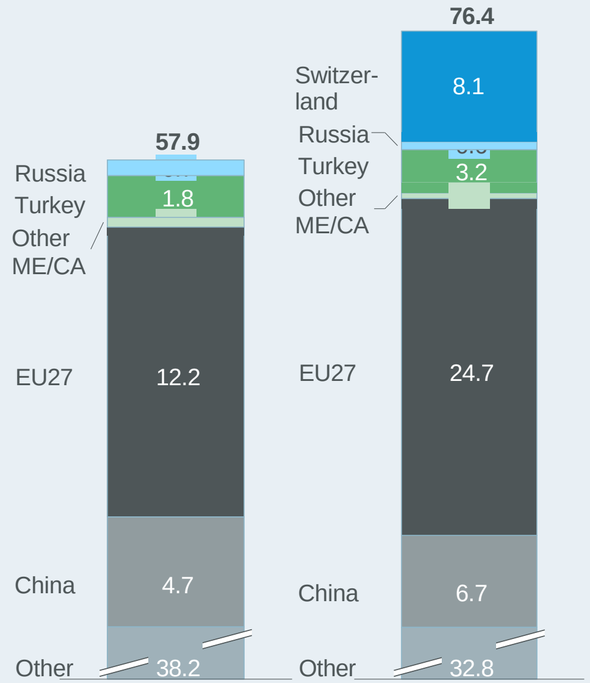
Land freight transport (%)

- Short transport distances mostly prevalent in ISR, strongly favoring road freight transport
- No official data available on modal split, however, anecdotal evidence suggests rail share between 5-7%

Key targets/policies

- Increasing rail modal share to reduce congestion and accidents on highways
- Separation of passenger and freight traffic via new Eastern Main Line (64 km electrified double track by 2026)
- Broad rollout of level 2 ETCS to increase safety and capacity
- Connecting Middle East network to major ISR ports via cross-border service to Jordan

Trade statistics (2019; USD bn)



Export

Top Export Goods (USD bn)[1)]

Chemicals & related	2.0
Plastics & rubbers	0.9
Metals	0.2
Foodstuffs	0.1

Import

Top Import Goods (USD bn)[1)]

Chemicals & related	2.3
Metals	2.3
Plastics & rubbers	1.5
Foodstuffs	0.9

1) For trade with CHN, RUS, TUR, CHE, GER, BEL, ITA

Source: IMF, UN Comtrade, World Bank, Expert interviews, Press research, Roland Berger

Expanding infrastructure and separating freight and passenger lines key to boost competitiveness

Israel key rail freight bottlenecks

1. Geographic setting unfavorable for rail freight – International trade conducted almost entirely via sea shipping, while inland routes mostly short distance and in urban areas
2. Geopolitical situation hindering integration of ISR into regional networks – Direct route to key trade partner Turkey via Lebanon/Syria not feasible due to ongoing conflicts
3. Underinvestment in infrastructure for rail freight leading to lack of inland cargo terminals and limited track access to key industry hubs/plants/quarries etc.
4. Significant regulatory hurdles for expanding rail track network, leading to time consuming application processes and very limited interest of private sector to support investments
5. Passenger services prioritized in rail network usage, significantly limiting attractive slot capacities for freight transport during the day

Source: Expert interviews, Press research, Roland Berger

D.3 Target picture and gap analysis

In target state, ME with rail freight as strong pillar of national and key regional trade lanes

Section overview

1 Regional development objective

- **Increase of modal share** of rail freight to double digits throughout regional networks in Middle East until 2030
- **Establishment of operational rail networks in ME countries** incl. new intermodal terminals at industry hubs and ports to make rail a pillar of national logistics networks
- **Creation of regional North-South and East-West transit links** with rail as commercially viable complementation of land and sea transport

2 Benefits of rail freight

- Developing rail freight expected to deliver **significant economic and environmental benefits** for Central Asia
- Rail freight seen as driver for **sustainability transformation, diversification of transport networks, regional economic development and trade collaboration,** and **reduction of road congestions**

3 Rail freight network and service development

- **GCC railway and national KSA and UAE network expansion as lighthouse rail development projects**, reviving rail networks in JOR, SYR, IRQ also key for establishing rail freight along major regional trade lanes
- **Strong focus on construction of new intermodal terminals** at key industry hubs and ports to connect rail to major goods transports within countries and cross-border

To make rail a pillar for Middle East logistics, connections to industry hubs and ports required

Middle East regional network target state

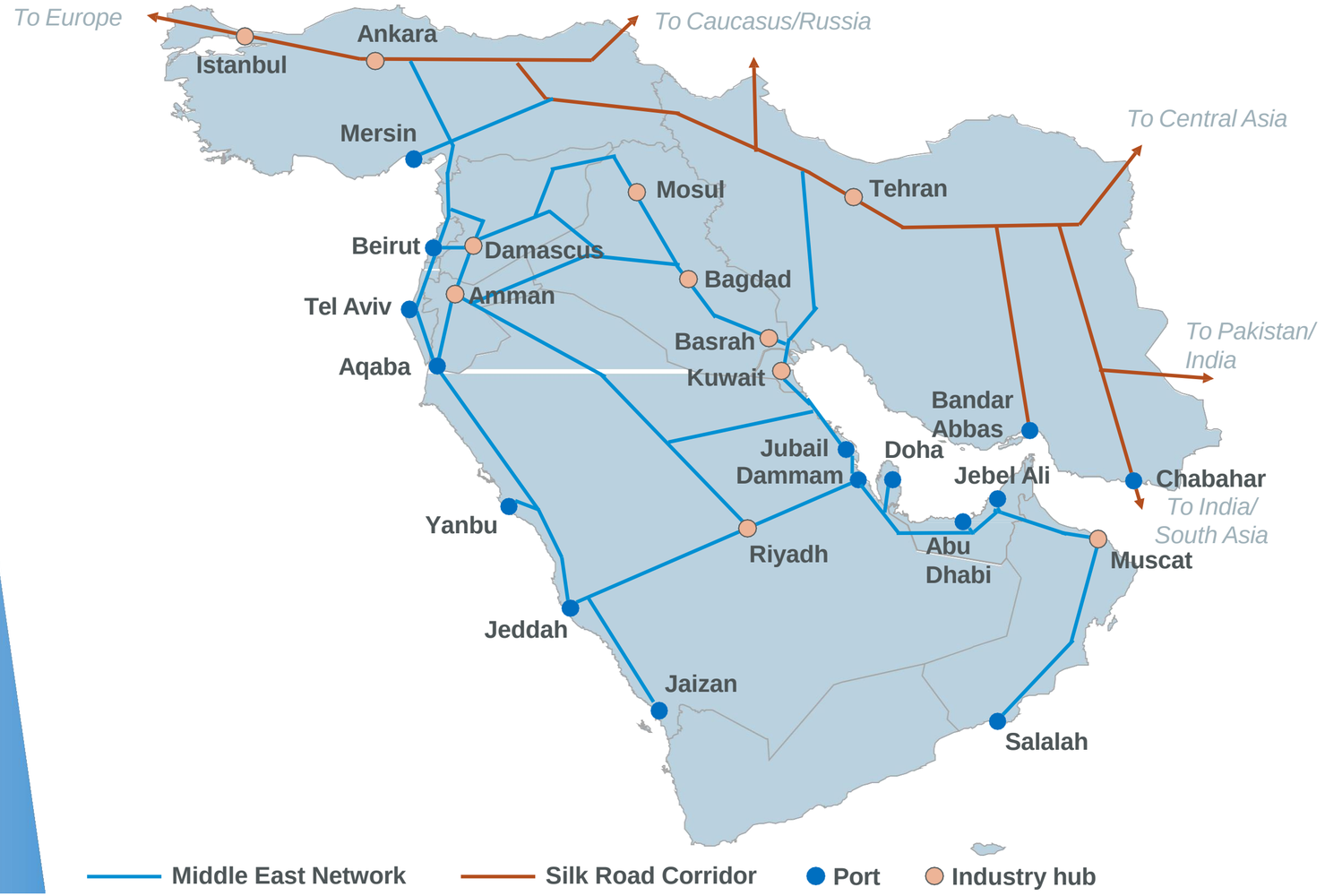
Roland Berger view

Target state for rail freight

>10% rail modal share for land transport freight volumes by 2030

Rail as commercially viable solution for regional East-West and North-South trade with selected cross-border transit opportunities

Rail network integrated into national logistics via terminals at key industry hubs and ports



Source: Roland Berger

Developing rail freight can catalyze economic and environmental target achievement in Middle East

Benefits of rail freight development in Middle East

- **Achievement of sustainability targets**
- **Diversification of transport network**
- **Support for economic development**
- **Strengthening of regional collaboration**
- **Reduction of road congestions**

Rail freight as sustainable alternative to road transport

Significant increase of inland network capacities and reduction of transit times

Rail lanes and terminals as logistic hubs and trade growth enablers

Cross-border rail links fostering economic and environmental cooperation

Shift of inland transport to rail as relief for congested road networks

Source: Roland Berger

Target state ME network connects rail to major North-South and East-West trade lanes

Middle East target state rail freight network

Key areas of network development

1 Completion of GCC rail connection

Key for connection of Persian Gulf ports to inland rail and establishing cross-border freight transport

2 East-West railway network for Saudi-Arabia

Esp. Dammam-Riyadh-Jeddah relevant to increase modal competitiveness of rail vis-à-vis road and short sea transport

3 New construction of Jordan rail network

Jordan currently with only very limited rail operations, new network required to revitalize national rail freight transport

4 Rebuilding of Iraq rail network and connection to Iran

Esp. oil regions in North/East Iraq cut off from rail network, connection with Iran as potential transit corridor for Gulf rail freight

5 New construction of Oman rail network

Oman currently without rail operations, however comprehensive plan for national rail network exists

1) Existing network in JOR is small gauge, planned network is standard gauge (1,435 mm)

Source: National railways, Press research, Roland Berger

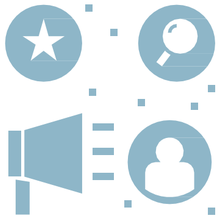
D.4 UIC action modules

UIC support for Middle East rail freight development builds on three focus activity areas

UIC support activities for Middle East

I Promote target state and raise awareness for key topics

- Communication of network goals, benefits of rail freight and target achievement gaps
- Informing on relevance of regional collaboration to operationalize cross-border connections
- Diffusion of knowledge on rail connectivity planning, e.g., at multimodal terminals
- Connection of railway associations and infrastructure providers with international development partners



II Operationalize RAME freight group

- Establishing target picture for rail freight and key gaps
- Sharing of best practices and commercial/technical training
- Definition of development projects and supporting operational implementation

UIC as key enabler for ME rail by creating visibility and supporting project execution

III Detail RAME rail freight support toolkit

- Infrastructure planning and feasibility study conduction
- Tender design, procurement approaches and sources of financing
- Project implementation monitoring and measuring of key performance indicators
- Commercial operations, e.g., transparent pricing/tariffs
- Operations setup, standard development and training

Source: Roland Berger

The communication action plan focuses on promoting ME targets and diffusing knowledge

Stakeholder communication

Message	Target audience: Financing partners	Govern-ments	Infrastruc. providers	Interna. organiz.	Logistic platforms	Railway assoc.	Communication channel	Description
Ambition for national rail freight, key benefits and gaps for target achievement	Moderate	High	High	High	Moderate	High	Rail and development conferences, government roadshow, study/news publication	Governments as lobby focus due to responsi-bility for rail strategy and project steering
Success factors for cross-border rail network development	Limited	High	Moderate	Moderate	Moderate	High	Rail conferences, workshops, government roadshow	Very limited ME experience with cross-border rail, sharing of best practices key
Improving intermodal connectivity in logistic networks	Moderate	High	High	Moderate	Limited	High	Rail conferences, workshops, study/news publication	Large new terminals in planning, knowledge around state-of-the-art multimodal connectivity required
Raising awareness for financing and other project development needs	High	High	Moderate	High	Limited	Moderate	Rail and development conferences, government roadshow, working groups	Addressing of European and Asian partners key for development need communication

High relevance | Moderate relevance | Limited relevance | Deep dive

Source: Roland Berger

To facilitate new cross-border operations, UIC can share best practices from Eurasian corridors

Potential UIC action module (1/2)

Communication and awareness building

Success factors for seamless cross-border rail operations

Objective

- Facilitation of planned cross-border rail services, e.g., via customs and data exchange harmonization and digitization
- Establishing initiatives for regional railway standards, legal frameworks and operational collaboration, e.g., across GCC countries

Key messages

- Timely alignment on customs and other border control procedures (e.g., dangerous goods handling) required to operationalize cross-border rail networks
- International best practices (e.g., CIM/SMGS) underscoring relevance of harmonized customs systems as key enabler for large volume cross-border rail freight
- Development of common set of intermodal standards required to ensure high quality and safe cross-border operations (e.g., track systems, personnel qualification, rolling stock requirements)
- Different forms of operational collaboration available to facilitate optimal resource allocation between national railways, e.g., via wagon lending

Recipients

- National ministries for transport and trade
- National railway associations

Format

- Presentation and discussion of general topics within RAME freight group
- Workshop series on selected cross-border operation topics in cooperation with relevant partner organizations, e.g., CIT for custom consignment harmonization

Source: Roland Berger

To support the integration of rail in logistic networks, UIC can spread knowledge on connectivity

Potential UIC action module (2/2)

Communication and awareness building

Improving intermodal connectivity in logistic networks

Objective

- Increasing volume potential for rail freight in Middle East by raising awareness for optimized intermodal connectivity networks
- Promoting setup of multimodal logistic centers at key trade hubs, e.g., Persian Gulf ports
- Diffusion of international best practices for interconnectivity infrastructure

Key messages

- Rail freight as cornerstone of multimodal logistic networks to facilitate inland transport and hinterland port connections
- Optimizing interconnectivity key to unlock full volume potential for rail freight and increase competitiveness vis-à-vis road and other transport modes
- International benchmarks as important impulse for national infrastructure development, e.g., Hamburg port for hinterland rail connection
- No "one-size-fits-all" connectivity solution, multimodal logistics network design requires adaptation to specific regional environment

Recipients

- National ministries for transport and trade
- National railway associations
- Rail infrastructure providers

Format

- Impulse presentation at rail conferences, e.g., during UIC rail freight week in 11/2022
- Presentation and discussion of general topics within RAME freight group
- Roadshow with selected governments, e.g., in GCC countries

Source: Roland Berger

2022 as phase of activity preparation for UIC to ensure full operationalization of RAME in 2023

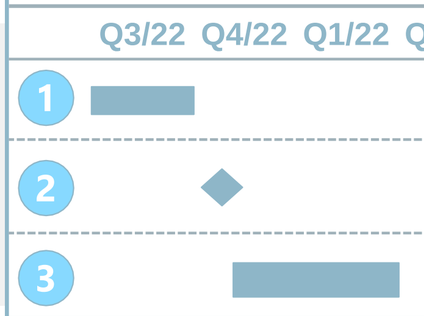
RAME freight group operationalization

Target picture operationalization

Activities

1. Communication and feedback collection on target state with RAME freight experts to develop project roadmap
2. Official presentation and endorsement by RAME Management Committee
3. Government, rail assoc. and logistic partner roadshow and support lobbying

Timeline

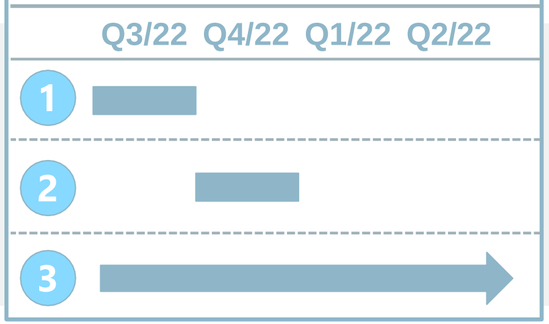


Best practice sharing

Activities

1. Collection of commercial/ technical/project execution expertise development needs, e.g., via survey or onboarding interviews
2. Identification of relevant UIC or external experts, e.g., from Europe rail freight groups and organization of workshops
3. Setting up RAME rail freight knowledge base, e.g., transportation statistics, commercial success factors, pricing approaches

Timeline

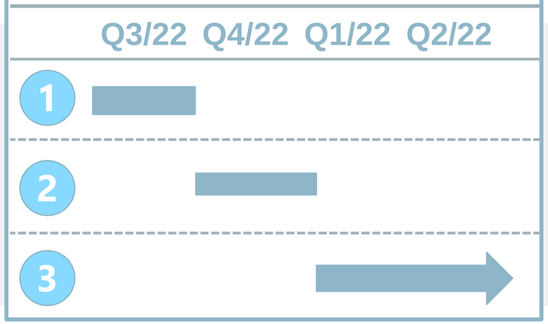


Project implementation support

Activities

1. Setting up toolkit for rail project development and structuring of support activity/resource packages
2. Prioritization of development projects with RAME experts and alignment of concrete work plans/timelines
3. Allocation of UIC support resources and transparent monitoring of implementation, quarterly reporting to RAME Management Committee

Timeline



Operating model

- RAME freight group as vehicle to bridge geopolitical challenges and foster cooperation among member organizations
- Neutral group steering essential, e.g., for agenda setting, participant selection
- Mutual agreement on collaboration guidelines and conflict resolving mechanisms required at the start of group activities

Source: Roland Berger

Different toolkit elements are required for RAME members depending on current project maturity

Toolkit for rail network development

Rail network development process (schematic)

	Infrastructure/ network planning	Feasibility study conduction	Financing	Tender manag./pro-curement	Implement. tracking/ supervision	Sales and key account manag.	Operations/ training
Selected toolkit elements	• Intermodal terminal develop-ment • Combined transport design • Rolling stock requirements	• Support design of studies for operations, financial, environment, traffic forecast	• Identification of funding models, e.g., public, public-private partnerships, private sponsors	• Assessment of tender procedure suitability, e.g., BOT vs. BOO	• Identification of relevant KPIs and measuring approaches for develop-ment projects	• Best practice sharing for setup of commercial pricing/tariff systems	• Develop-ment of rail operating standards • Develop-ment of rail training academies

Relevance for RAME members

Establish "financing-ready" rail projects → **Identify project financing and execution partners** → **Coordinate project execution and ensure commercialization**

Low — **Current rail freight project maturity** — High

Source: Roland Berger

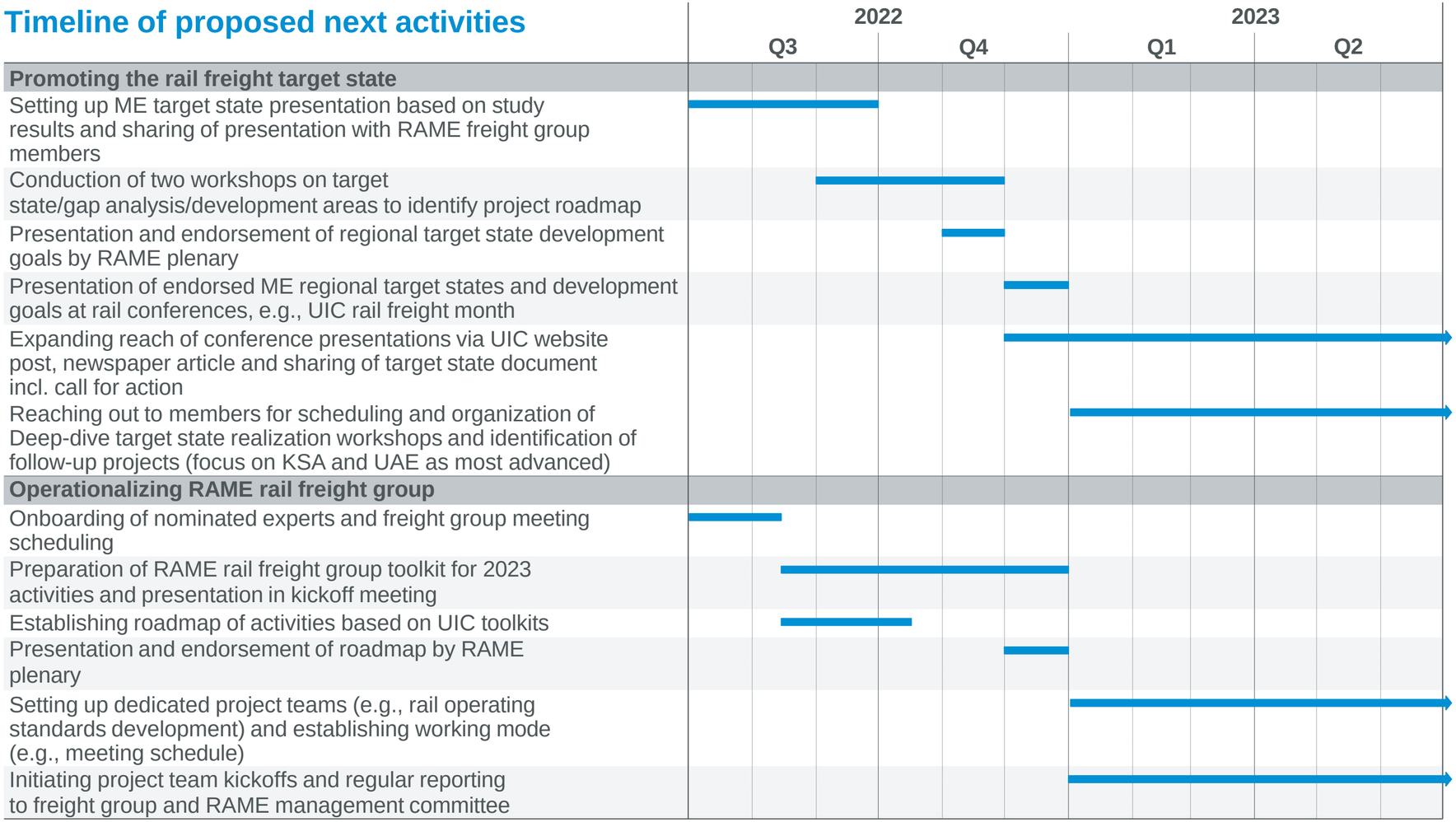
Promoting national target states, RAME kick-off & toolkit development as immediate action plan

Immediate UIC action plan (1/2)

Achievements and starting point

- ✓ **Status quo situation and key bottlenecks assessed**
- ✓ **Target picture of regional rail freight development drafted**
- ✓ **Initial action fields for UIC support developed**

Timeline of proposed next activities



Source: Roland Berger

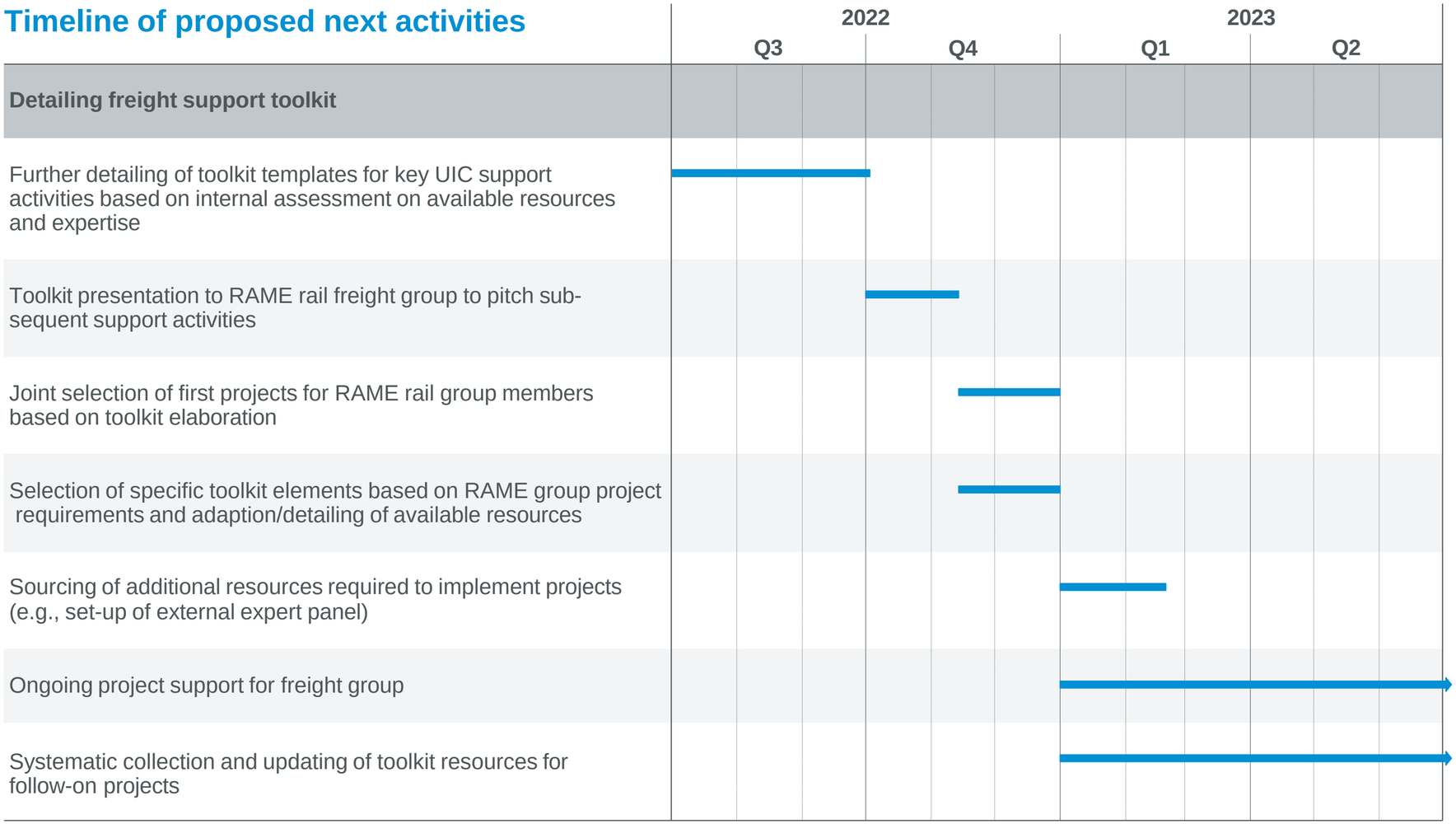
Promoting national target states, RAME kick-off & toolkit development as immediate action plan

Immediate UIC action plan (2/2)

Achievements and starting point

- ✓ **Status quo situation and key bottlenecks assessed**
- ✓ **Target picture of regional rail freight development drafted**
- ✓ **Initial action fields for UIC support developed**

Timeline of proposed next activities



Source: Roland Berger

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