



## Overland Transport Development in the "Belt and Road" Initiative

Harrod, Steven

*Publication date:*  
2020

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*  
Harrod, S. (Author). (2020). Overland Transport Development in the "Belt and Road" Initiative. Sound/Visual production (digital)

---

### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

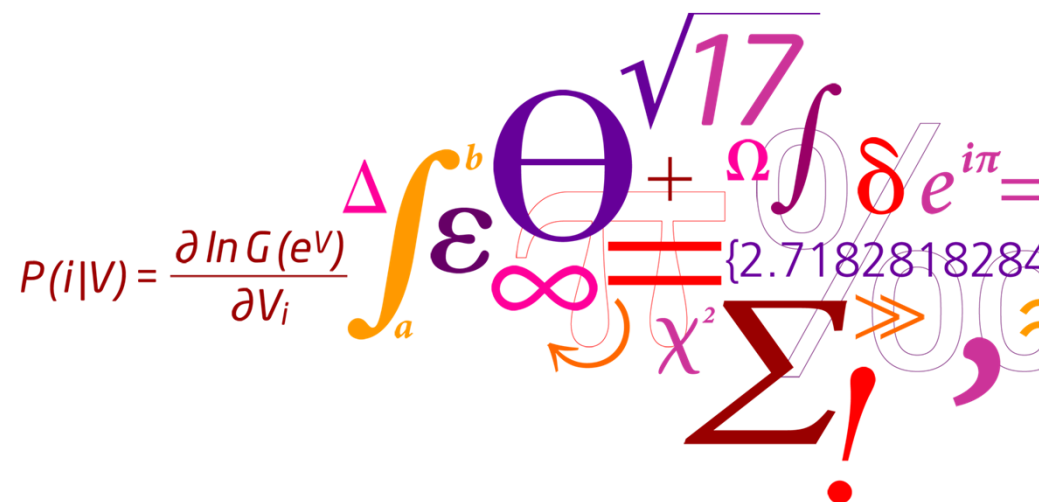
# Overland Transport Development in the “Belt and Road” Initiative

CBS “Logistics Clusters”

4 December, 2020

Steven Harrod

Technical University of Denmark

$$P(i|V) = \frac{\partial \ln G(e^V)}{\partial V_i} \int_a^b \varepsilon \Theta + \Omega \int \delta e^{i\pi} = \{2.7182818284\}$$




# Introduction

- Introduction to railway intermodal and relationship to clusters
- Explanation of the Belt and Road Initiative
- Railway links Europe-Asia
- Trade forecasts Europe-Asia
- An Example

1986

# About Me

2015



# Railway Freight and Sustainability

- Railways are extraordinarily well suited to large volumes of freight
  - Highest weight limit of any mode
  - 3x unit volume – railway wagon compared to truck
- Extraordinary sustainability support
  - Can be entirely zero-carbon for direct energy consumption
  - Lowest energy consumption for land-based transport
- Energy consumption
  - Kilojoules per tonne-kilometer
  - USA figures (comparable to Russia-Asia)
  - Road: 2426, Rail: 209, 12:1
  - Germany – 4:1
- Sustainability is greater with longer, heavier trains, over longer distances

# Logistics Clusters and Railways

- Railways have lost market share due to dispersion
  - More remotely located facilities on cheap land
  - Government policies that favor development on road networks
  - Lower density makes consolidation of large traffic flows more difficult
- *A logistics cluster offers a concentrated, high density traffic flow to one location*

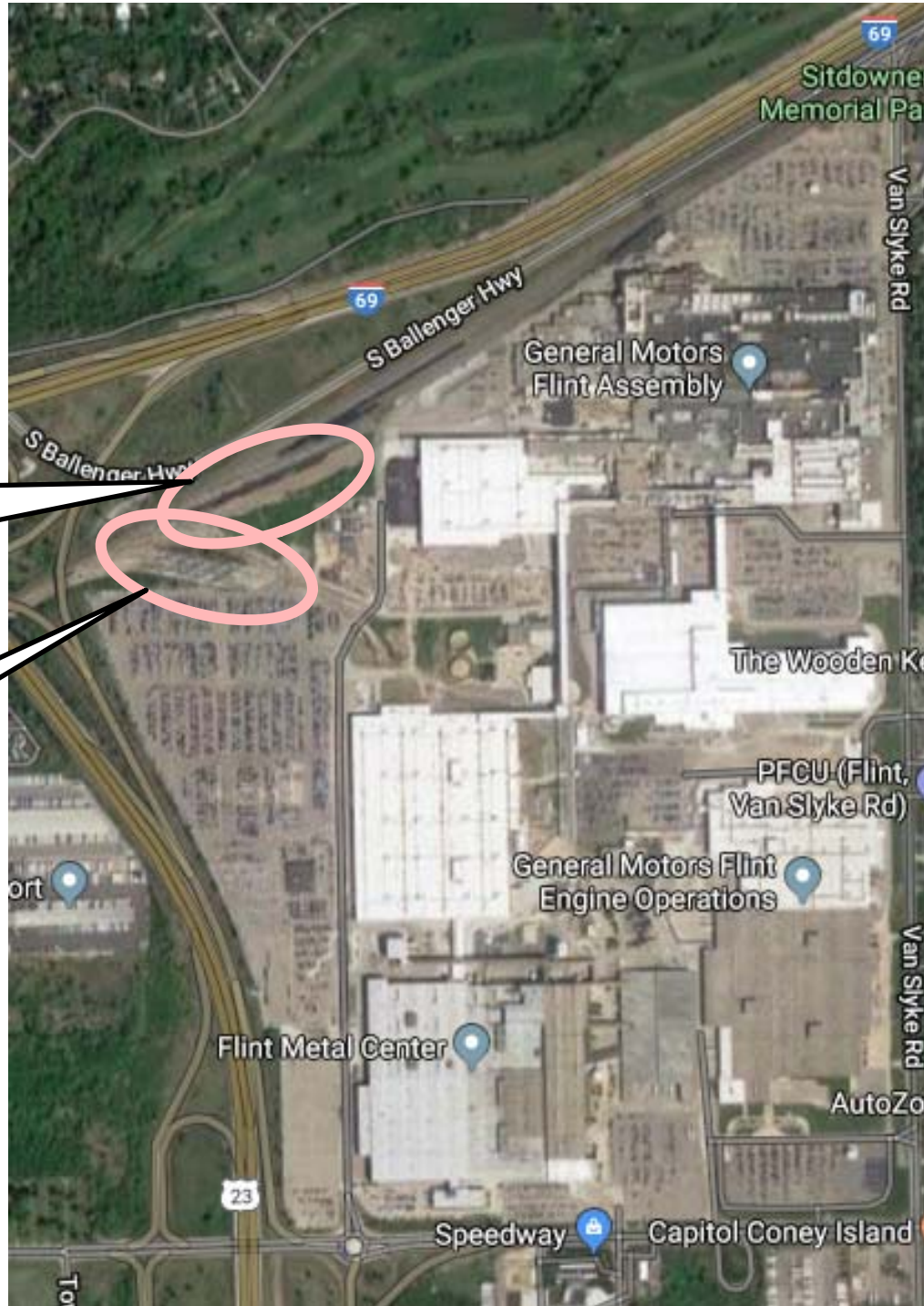
*Ideal for railways*

# GM Flint Assembly

Inbound parts  
Boxcars  
Truck frames

Finished Vehicle  
Shipment

Assembly plant from 1947



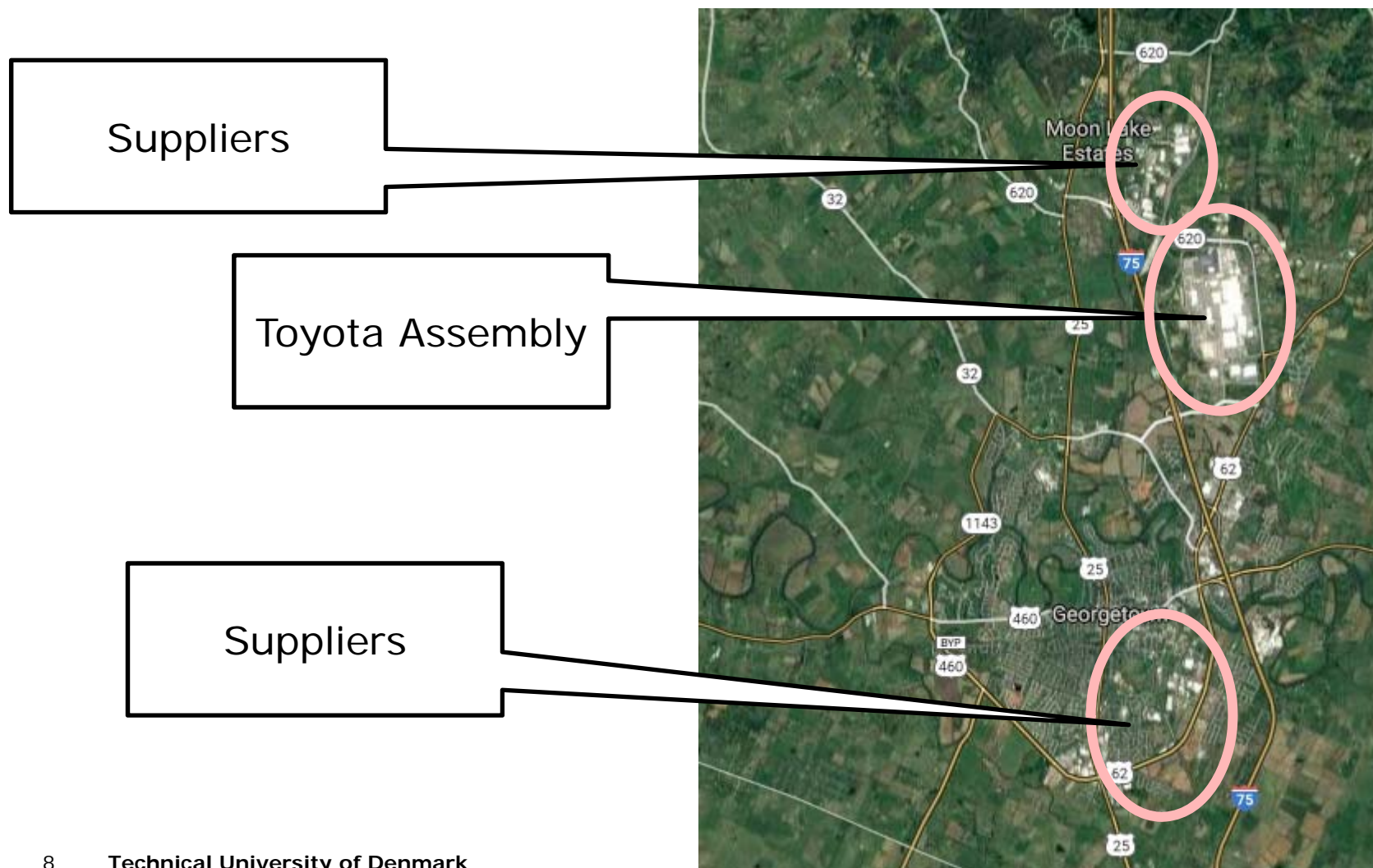
# Truck Frames Arriving for Assembly

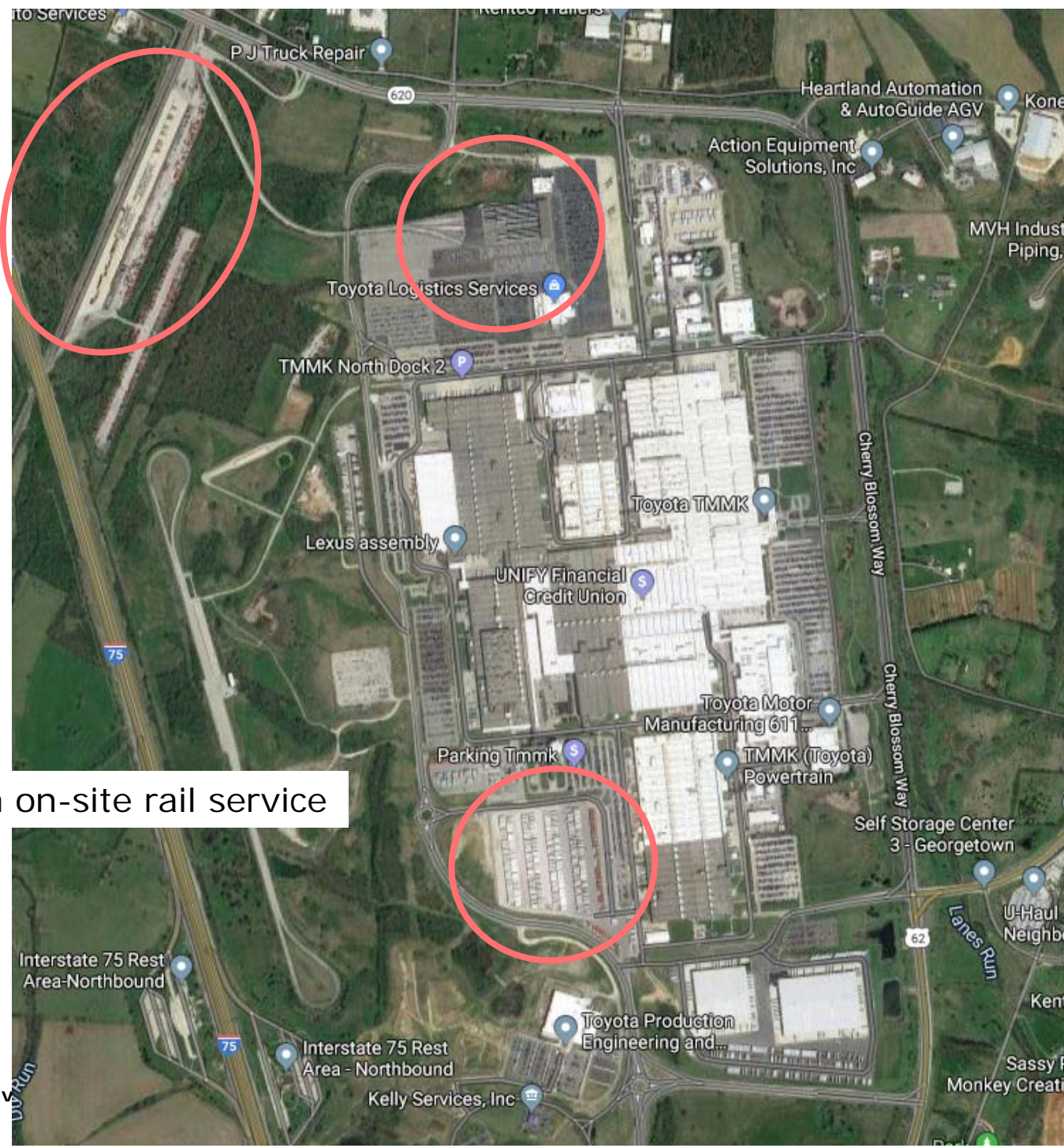




# Modern Cluster

## Toyota Assembly, Kentucky (1986)

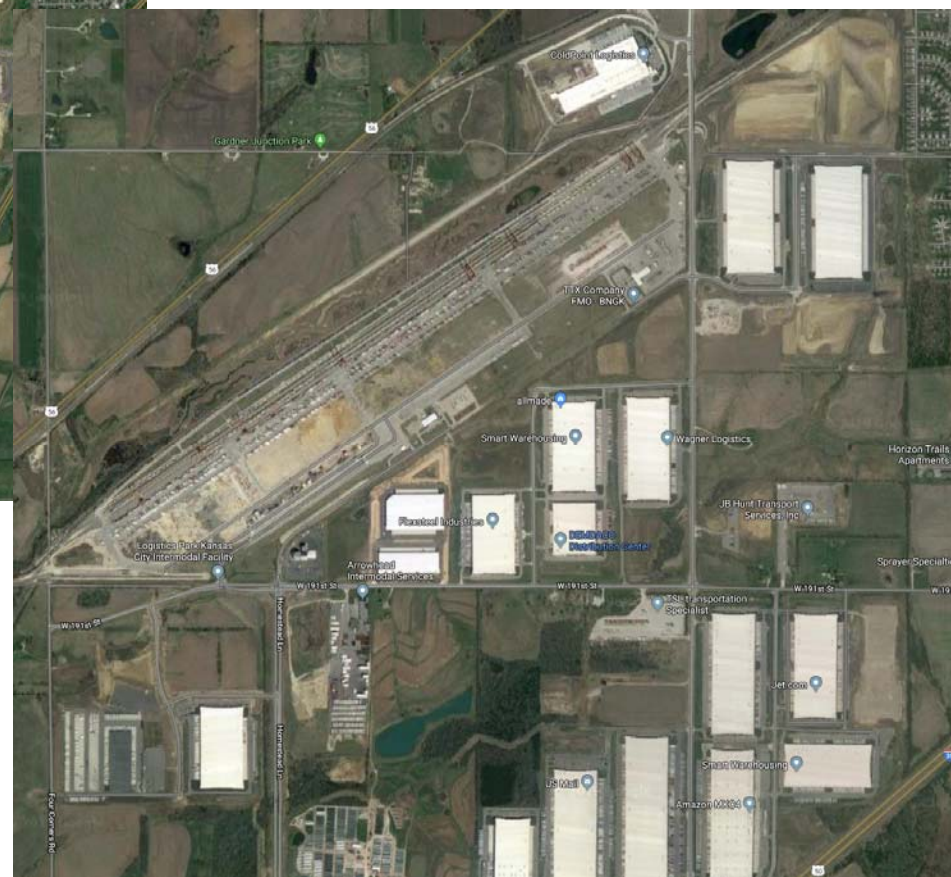




Reduction in on-site rail service

# Examples of Railway Logistics Clusters

## Dry Ports



Links to maps are embedded

# Dry Port Schematic

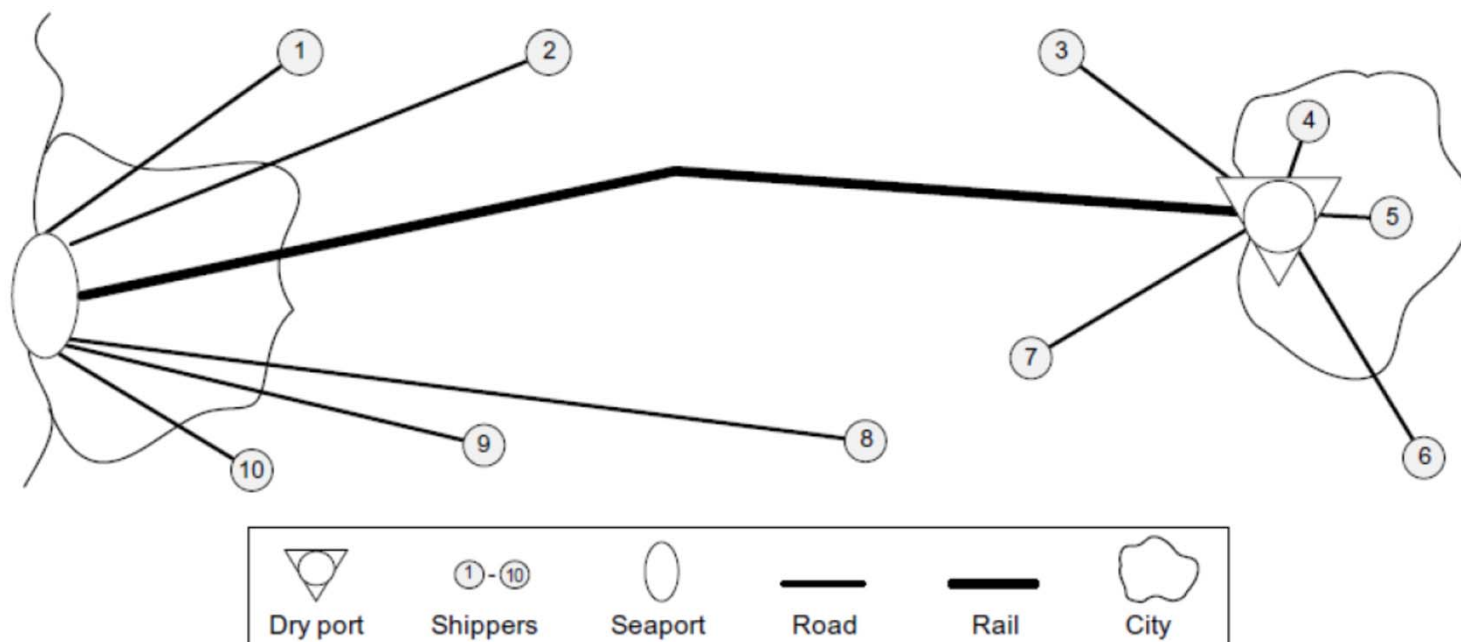


Figure 8: A seaport with a distant dry port (Roso et al., 2009)

# Terminal Costs are Frequently a Deciding Factor

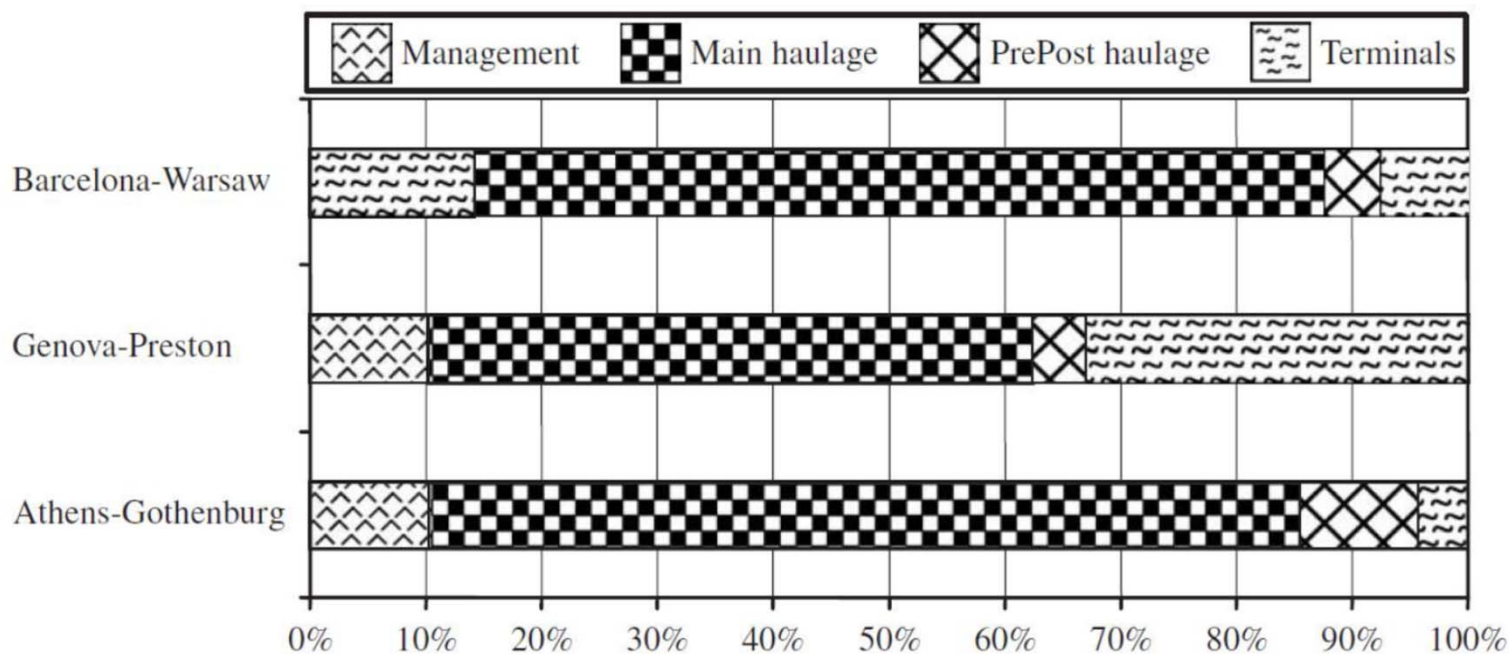


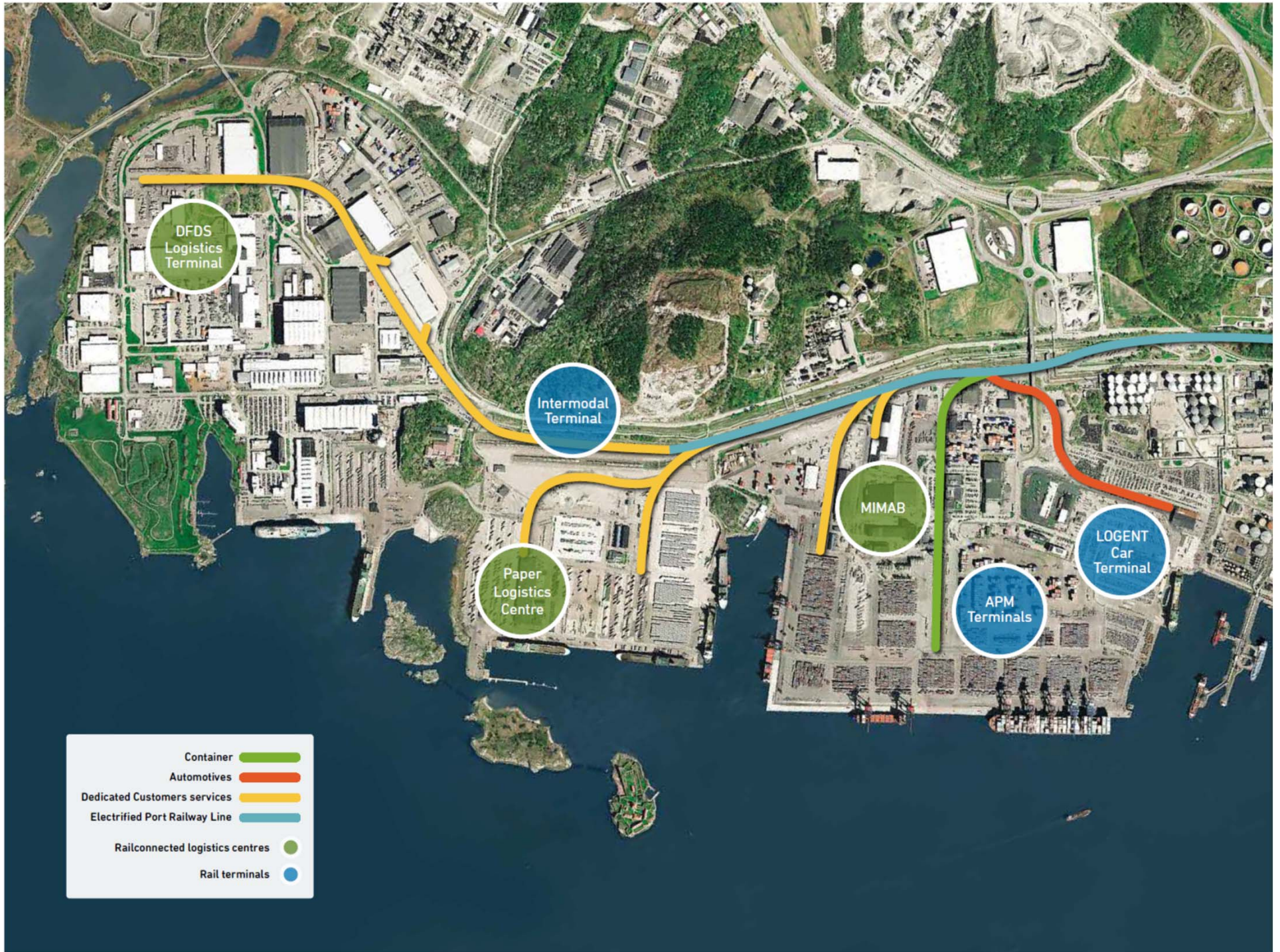
Figure 7: Composition of cost factors on selected intermodal transport routes (Ricci and Black, 2005)

# Examples of Railway Logistics Clusters

## High Density Shuttles

- Daily
- Full trains



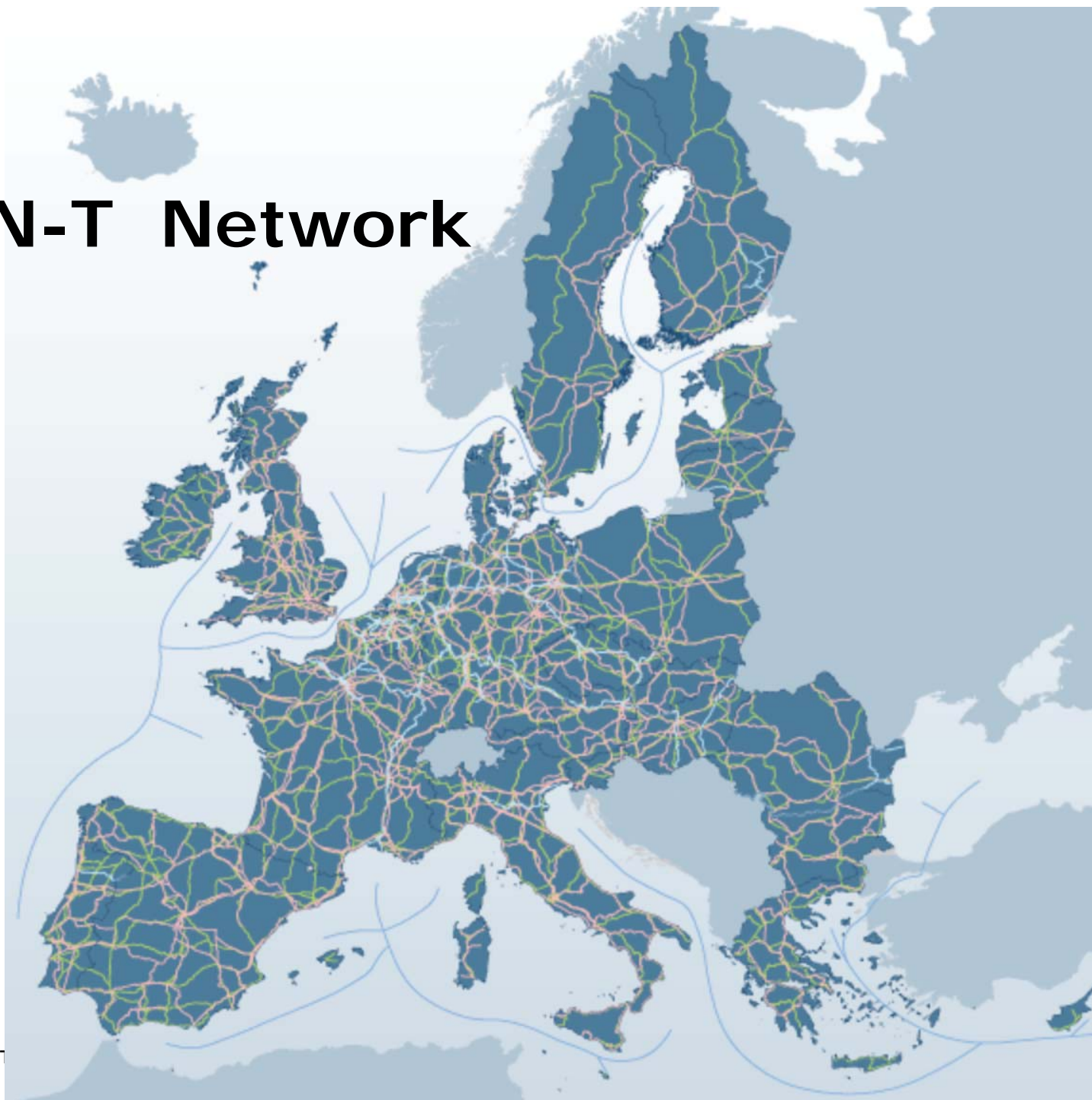


## Europe Has a Development Policy

- "Ten-T" is a designated EU network of (mostly) rail, marine, and road freight transport
  - To be preserved
  - To be eligible for EU investment funds
- "RFC" : Rail Freight Corridor
  - Priority corridors
  - "One stop shop" management
  - Priority for technical improvements for capacity and reliability

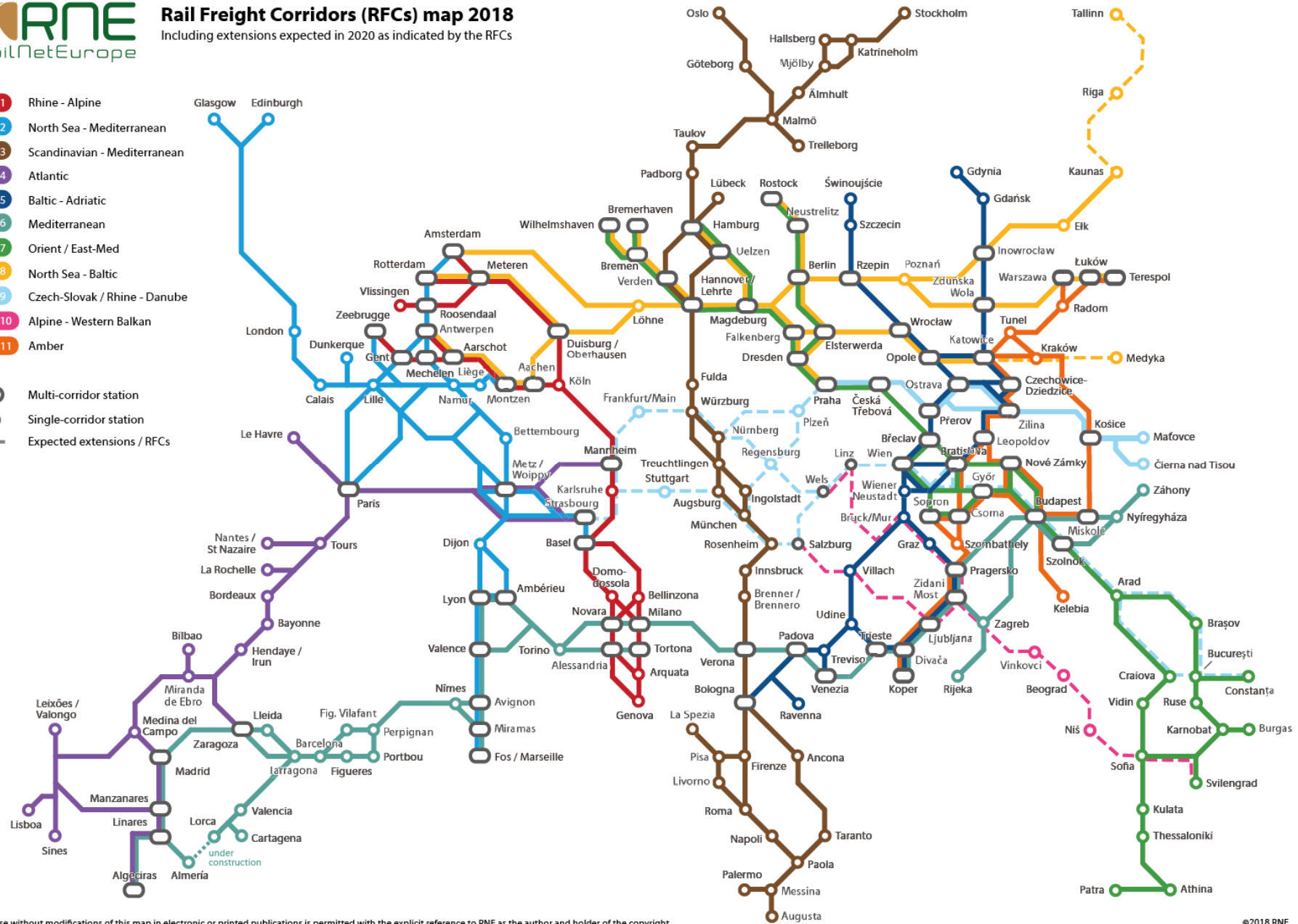


# TEN-T Network



- RFC1 Rhine - Alpine
- RFC2 North Sea - Mediterranean
- RFC3 Scandinavian - Mediterranean
- RFC4 Atlantic
- RFC5 Baltic - Adriatic
- RFC6 Mediterranean
- RFC7 Orient / East-Med
- RFC8 North Sea - Baltic
- RFC9 Czech-Slovak / Rhine - Danube
- RFC10 Alpine - Western Balkan
- RFC11 Amber

- Multi-corridor station
- Single-corridor station
- Expected extensions / RFCs

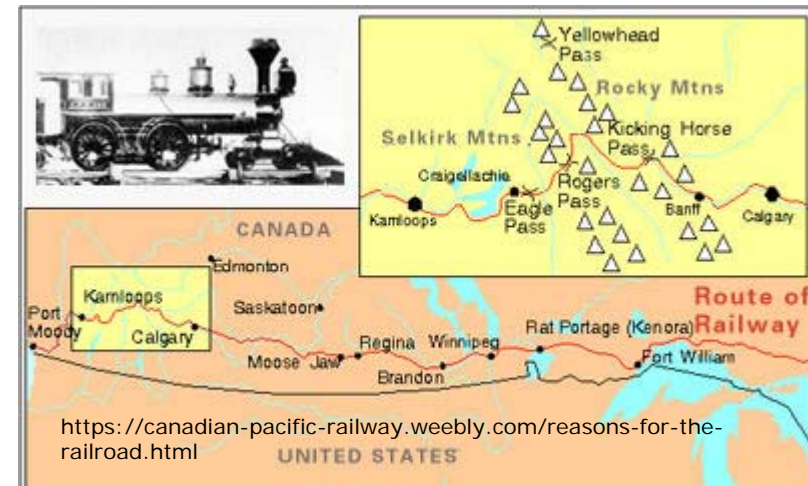
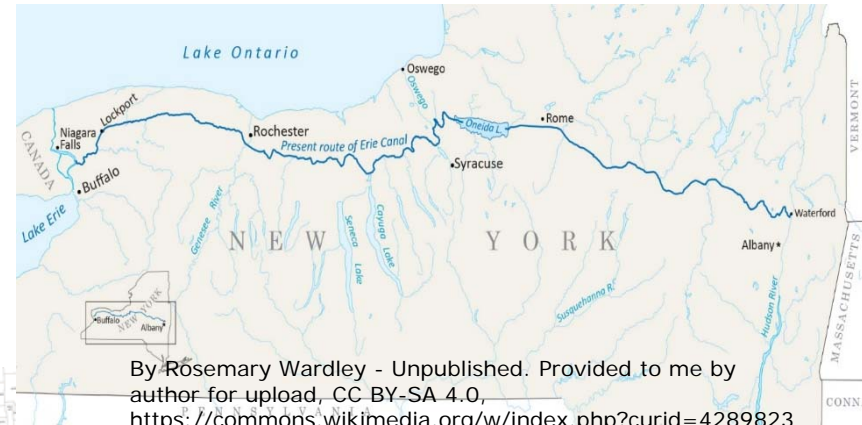
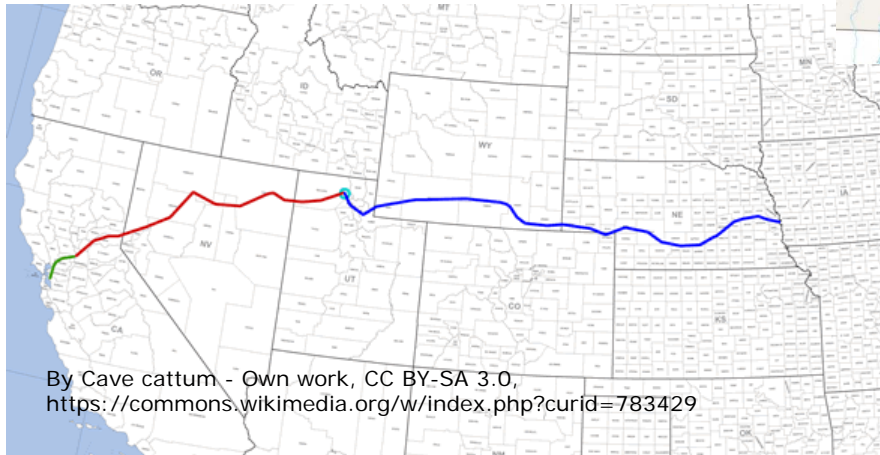


Any use without modifications of this map in electronic or printed publications is permitted with the explicit reference to RNE as the author and holder of the copyright.

# Now China is engaged in Belt and Road

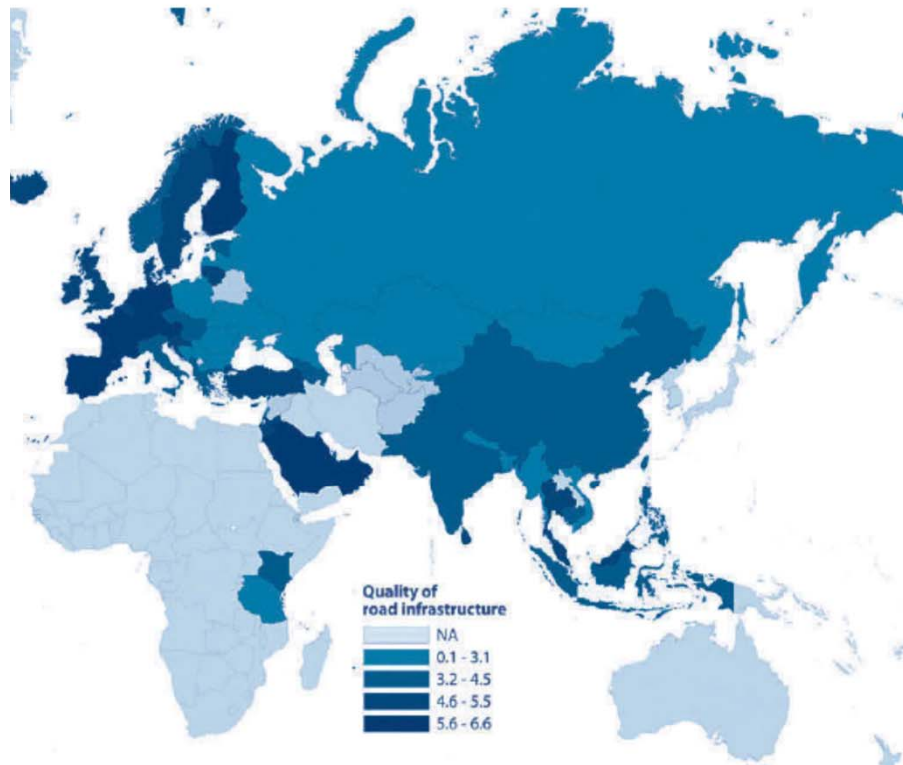
- “covering more than 68 countries, including 65% of the world's population and 40% of the global gross domestic product as of 2017”
  - “Belt” refers to the land routes
  - “Road” refers to the sea routes (confusing?)
- Originates in 2013
- Funding
  - Asian Infrastructure Investment Bank, US\$100 billion
  - Silk Road Fund, US\$40 billion

# There is a long history of nationbuilding with transport projects...

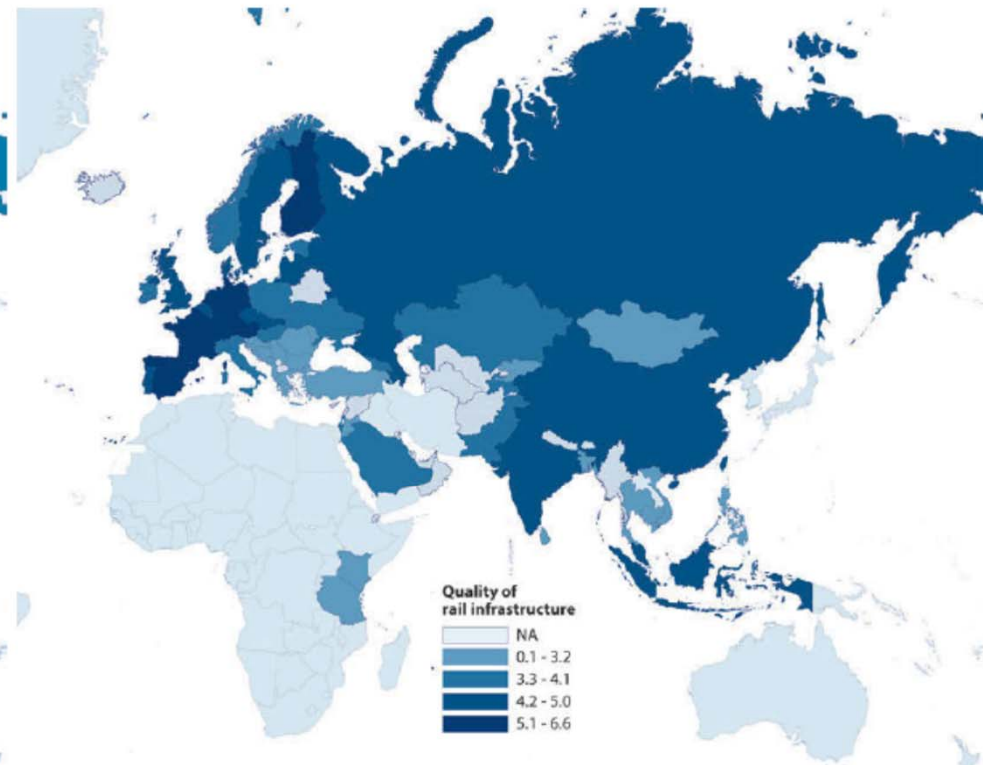


# Rail is a big player in Asia

a. Quality of road infrastructure



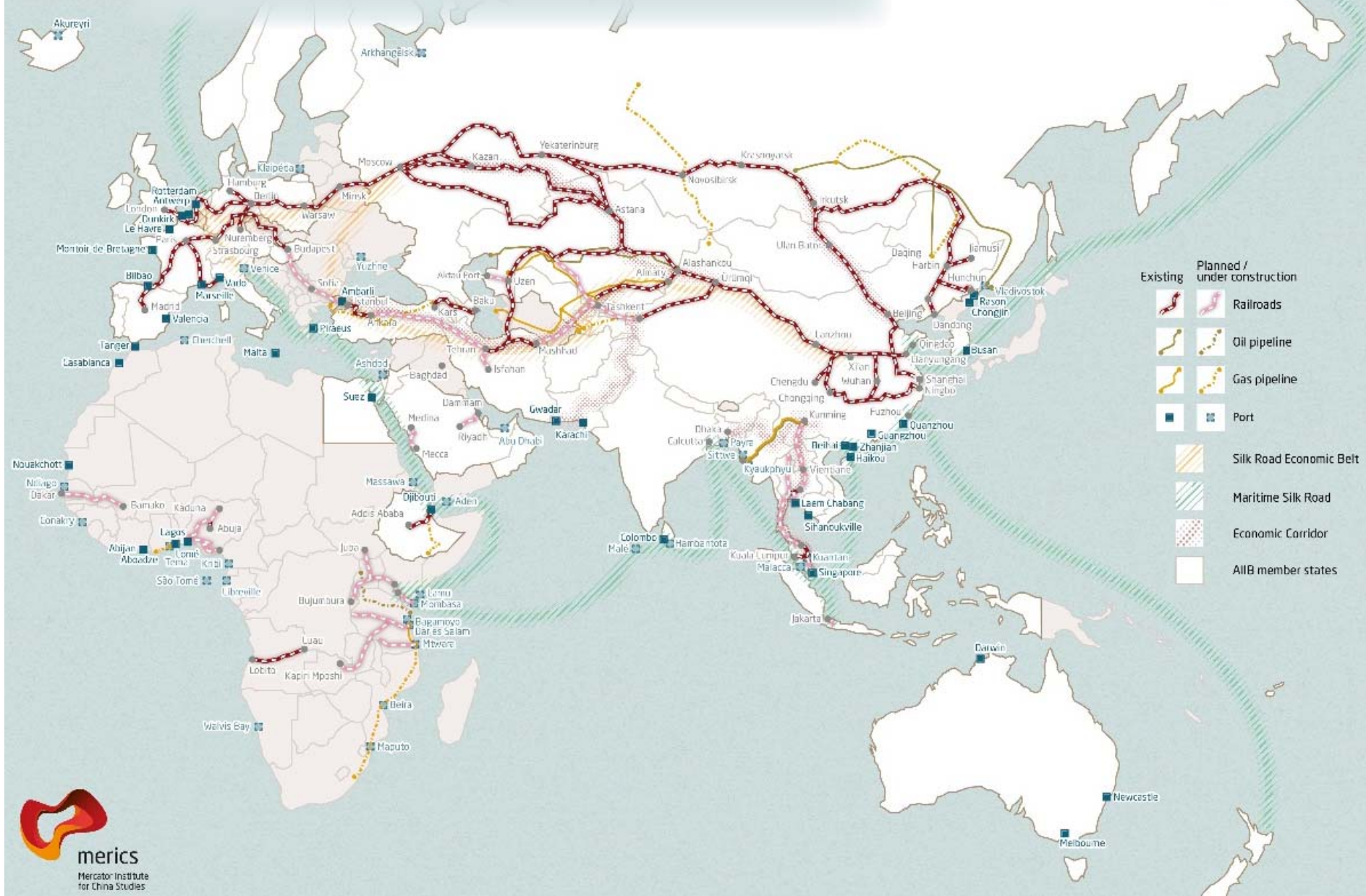
b. Quality of rail infrastructure



© 2019 International Bank for Reconstruction and Development / The World Bank  
DOI: 10.1596/978-1-4648-1392-4

# The Belt and Road Initiative creates a global infrastructure network

China uses, acquires and builds railroads, ports and pipelines



# The "Belt" has three declared collection zones

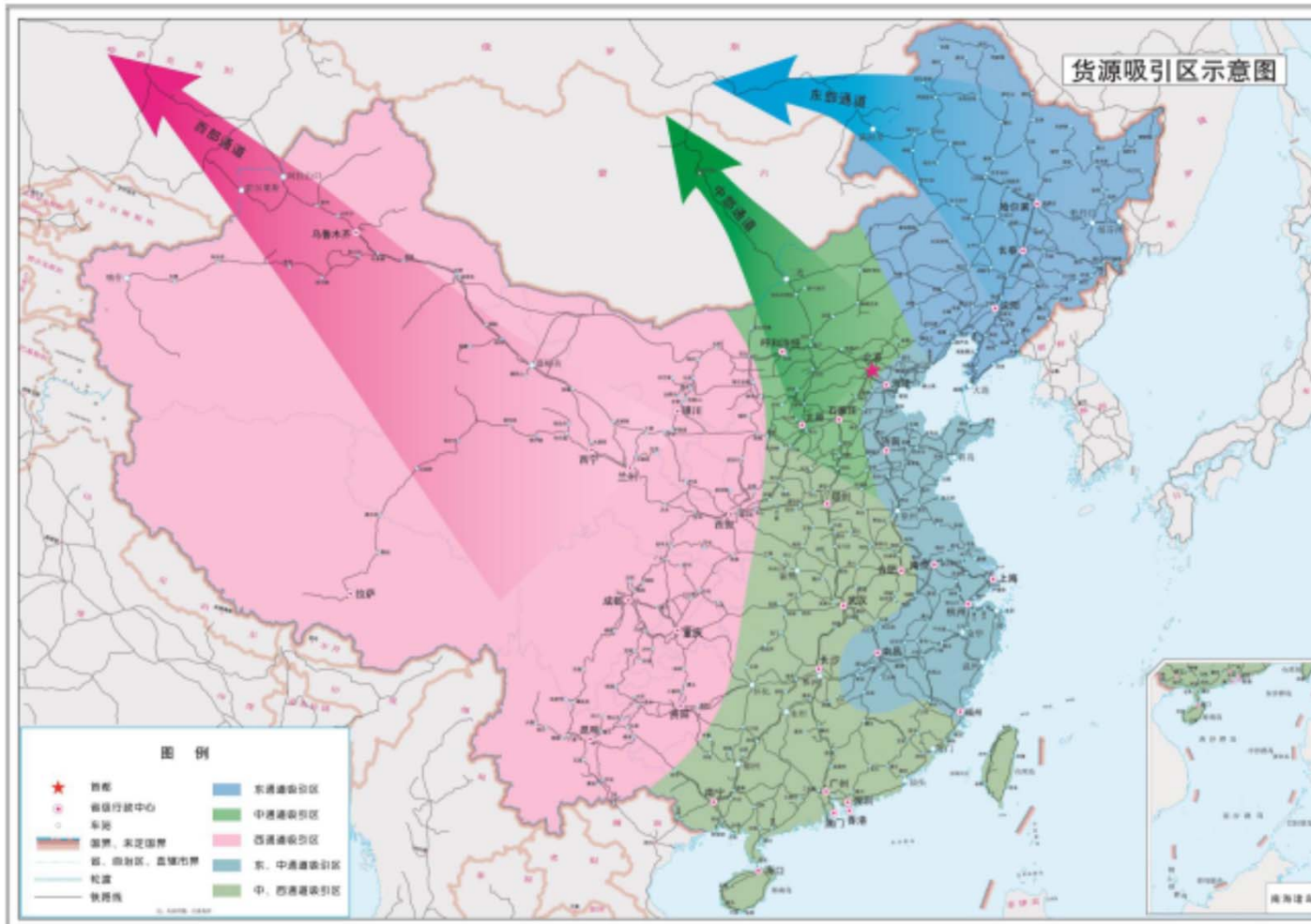
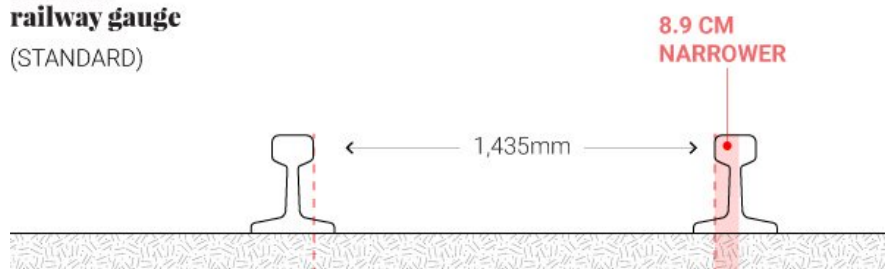


图2 三大通道货源吸引区示意图

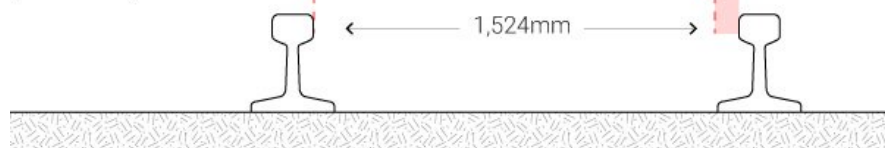
# Challenges in Overland Rail Route

- Russian railway gauge is different
- National borders and inspections
- Train length differences China-Russia-EU, 55: 75: 44 FEU

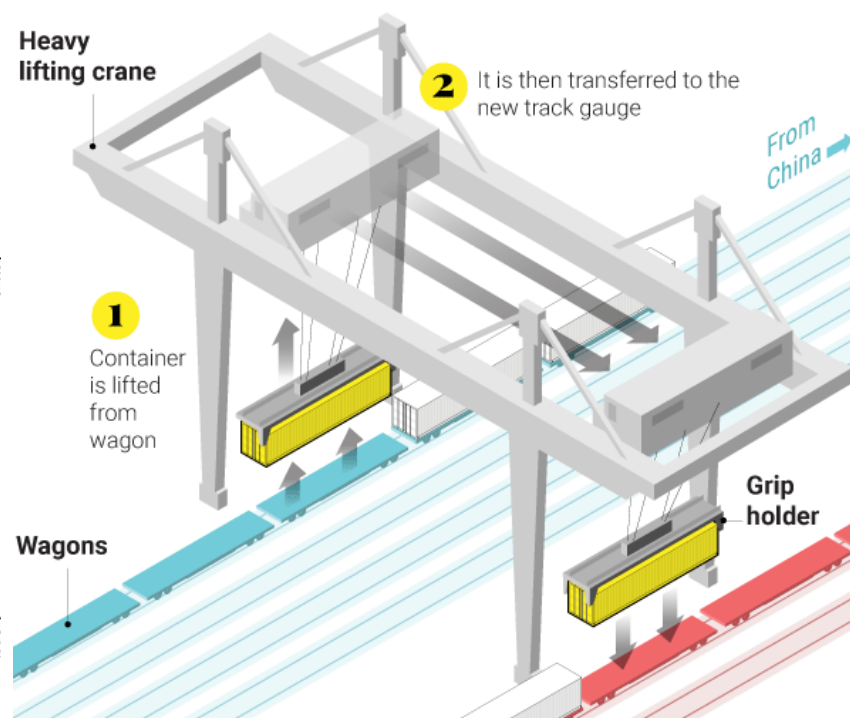
**Chinese railway gauge**  
(STANDARD)



**Russian railway gauge**  
(FIVE FOOT)



8.9 CM  
NARROWER

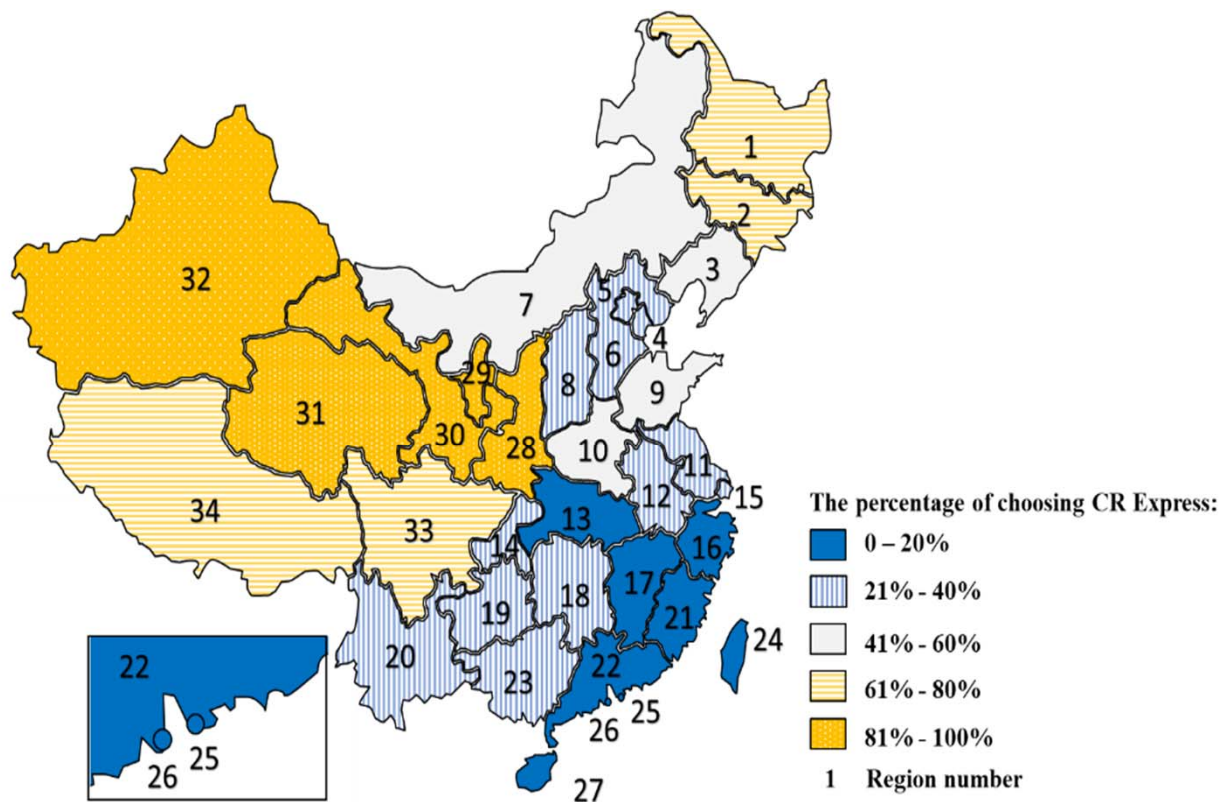




# In spite of this, great improvements in last 10 years

- Rail: Shanghai – Hamburg
  - 11.249 rail km
  - 16 days (about half of which is actually waiting in terminals)
  - US\$6.350 per 40 foot container
  - 16,9 km per hour!
- Ocean:
  - 20.053
  - 32 days
  - US\$2.410
- Road:
  - Bing maps drive time 116 hours= 4,8 days

# Inland zones more likely to choose rail

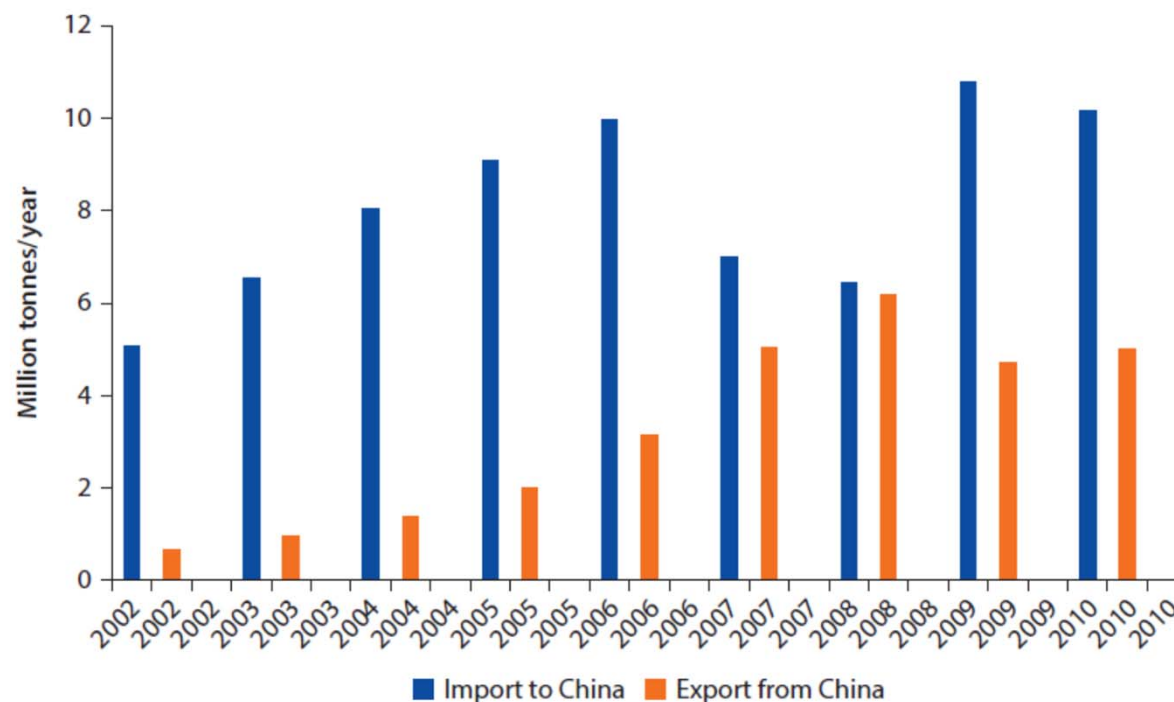


Source: Yingxiu Qi, Beijing Jiaotong University

# Benefit of Belt and Road

- The perception that this is all about exporting from China is false

Figure 3.1 Railway Border Crossing Traffic at Alashankou (Kazakhstan–China Border), 2002–10



© 2014 International Bank for Reconstruction and Development / The World Bank  
 1818 H Street NW, Washington, DC 20433  
 Telephone: 202-473-1000; Internet: [www.worldbank.org](http://www.worldbank.org)

# Update – Fall 2020

- Forecast growth in China
- Exports
  - 2021 +5,5%
  - 2022 +4,3%
- Imports
  - 2021 +7,1%
  - 2022 +5,6%



## European Economic Forecast

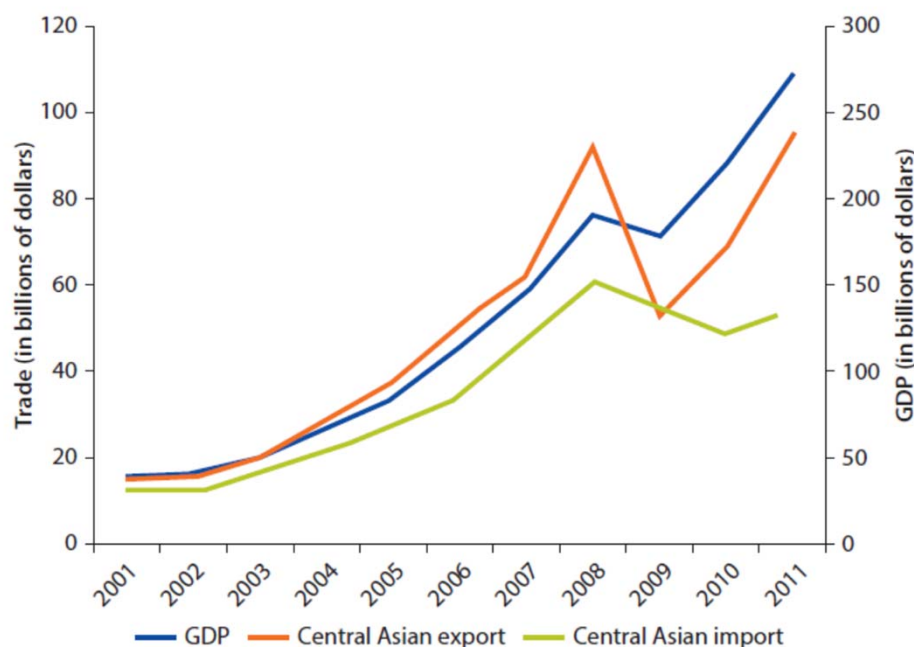
Autumn 2020

INSTITUTIONAL PAPER 136 | NOVEMBER 2020

# Side Economic Impact of Eurasian Corridor

- A railway benefits the locations it passes THROUGH as well as the end points
- Opens up Central Asia to development

Figure 1.1 Central Asian Countries: Trade Growth as a Percentage of GDP, 2001–11



© 2014 International Bank for Reconstruction and Development / The World Bank  
 1818 H Street NW, Washington, DC 20433  
 Telephone: 202-473-1000; Internet: [www.worldbank.org](http://www.worldbank.org)

# Growth Trend

- Traffic between the EU-28 and Asia will double, 2016-2027

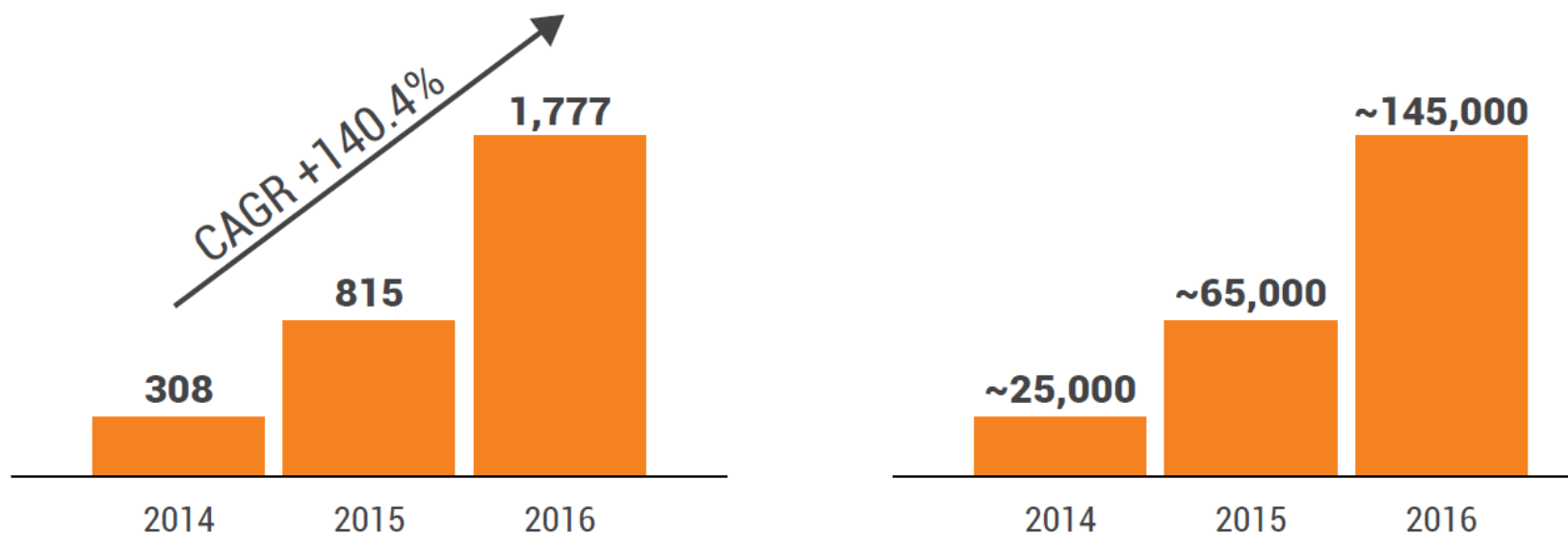


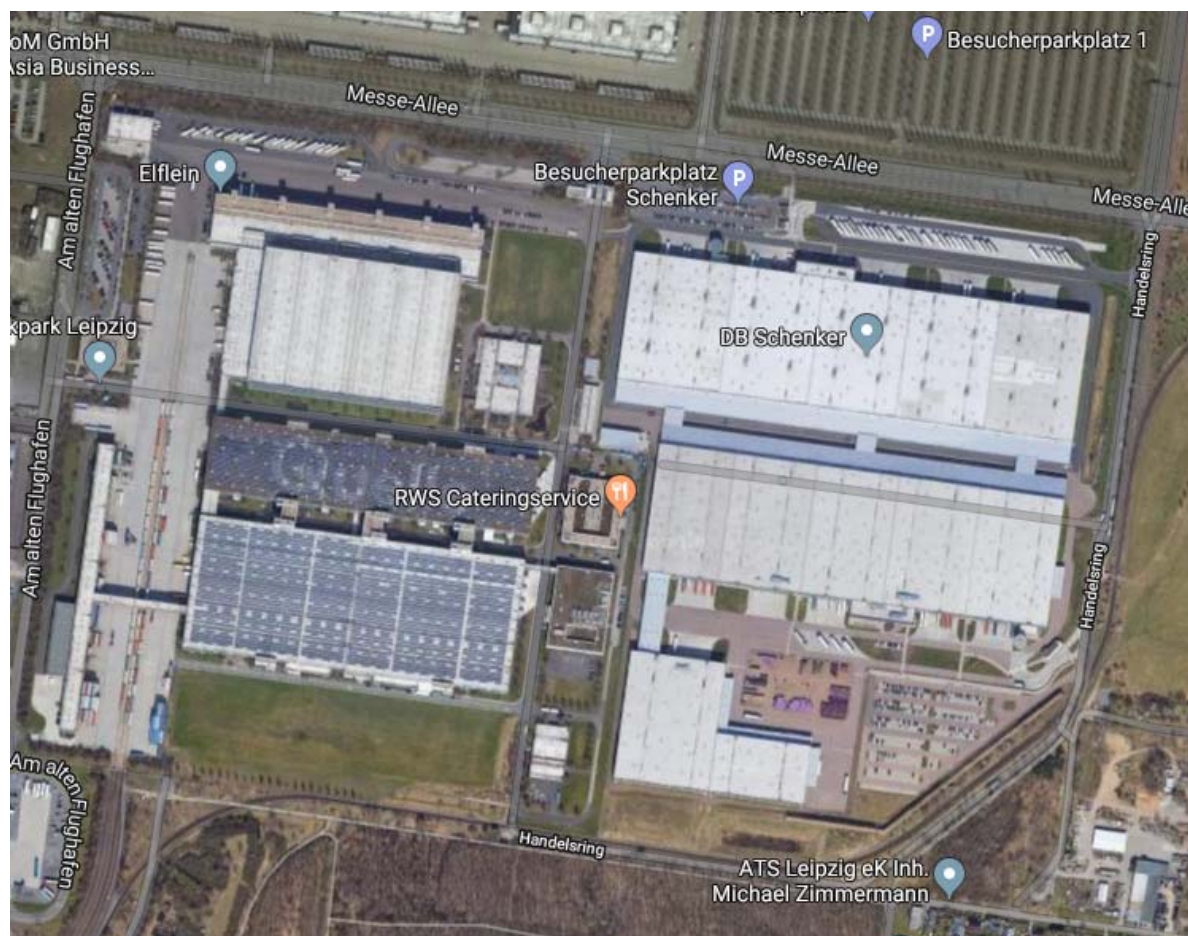
Figure 1: Development of rail freight transport between Asia and Europe from 2014 to 2016  
# trains (left) and TEU (right)<sup>3</sup>

Berger, Roland (2017) Study – Eurasian rail corridors: what opportunities for freight stakeholders? International Union

of Railways, Paris, ISBN 978-2-7461-2653-4

# DB Schenker Logistics Center Leipzig

- A full container train leaves daily for China
- Parts for assembly of BMW cars for China market



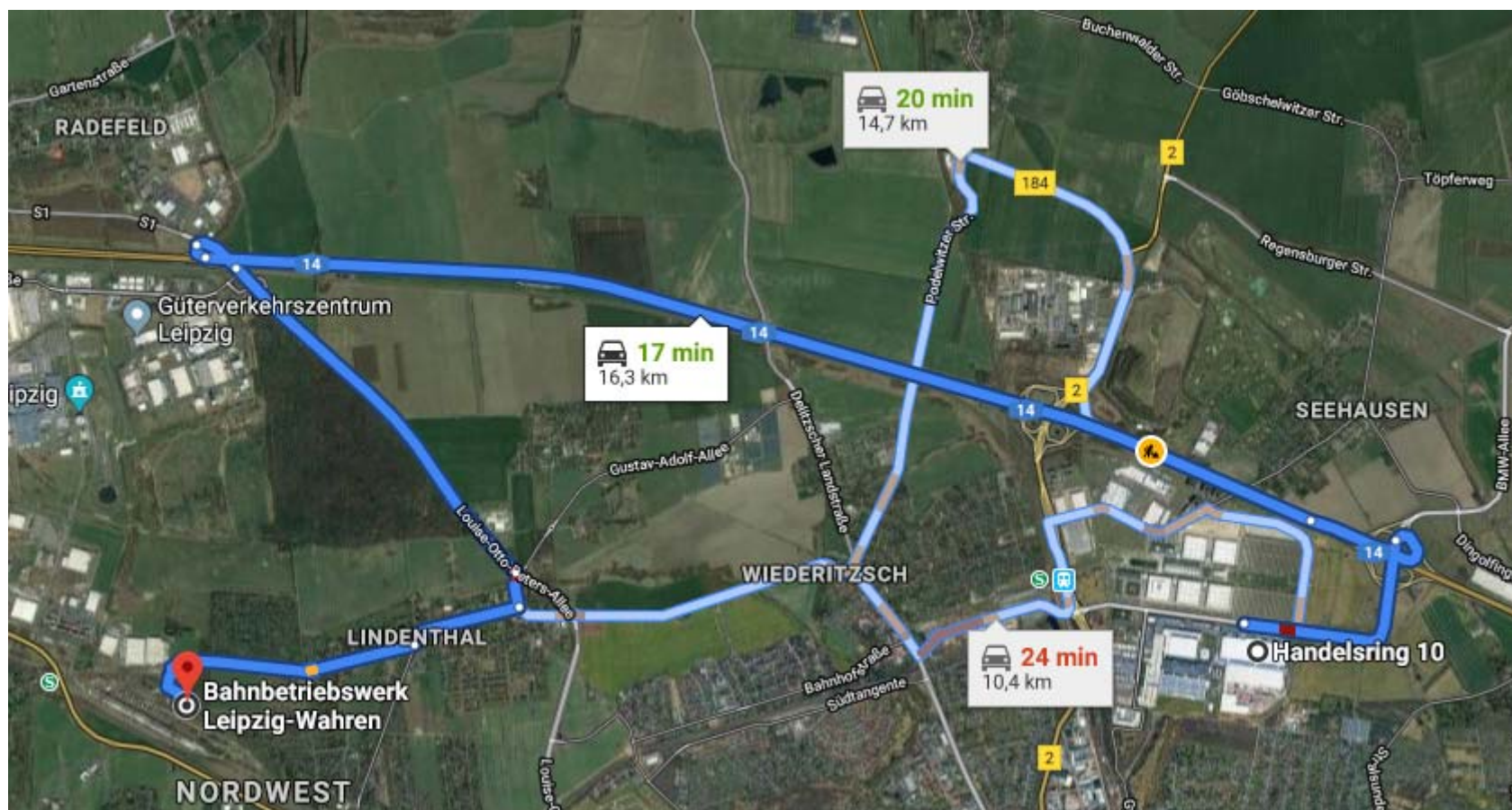
<https://youtu.be/V5LinEGBKIM>

# Loading Terminal for Trains to China





# Already, the Journey Starts With Extra Handling



## Possible Improvements

- Build a standard gauge railway through Russia
- Expand to double stack
- "Last mile" needs to be shorter



## Summary

- Rail is ideal transport for concentrated locations like logistics clusters
- The burden is still on railways to market and manage their services
- There is enormous potential for gains in sustainable operations and reduction in CO<sub>2</sub>
- Belt and Road offers benefits to all

# Thank you and “vi ses”

