



Shifting Passenger Transport from Air to Rail



Transportation Figures

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Air facts:

752.764.694 Passengers
in 2019

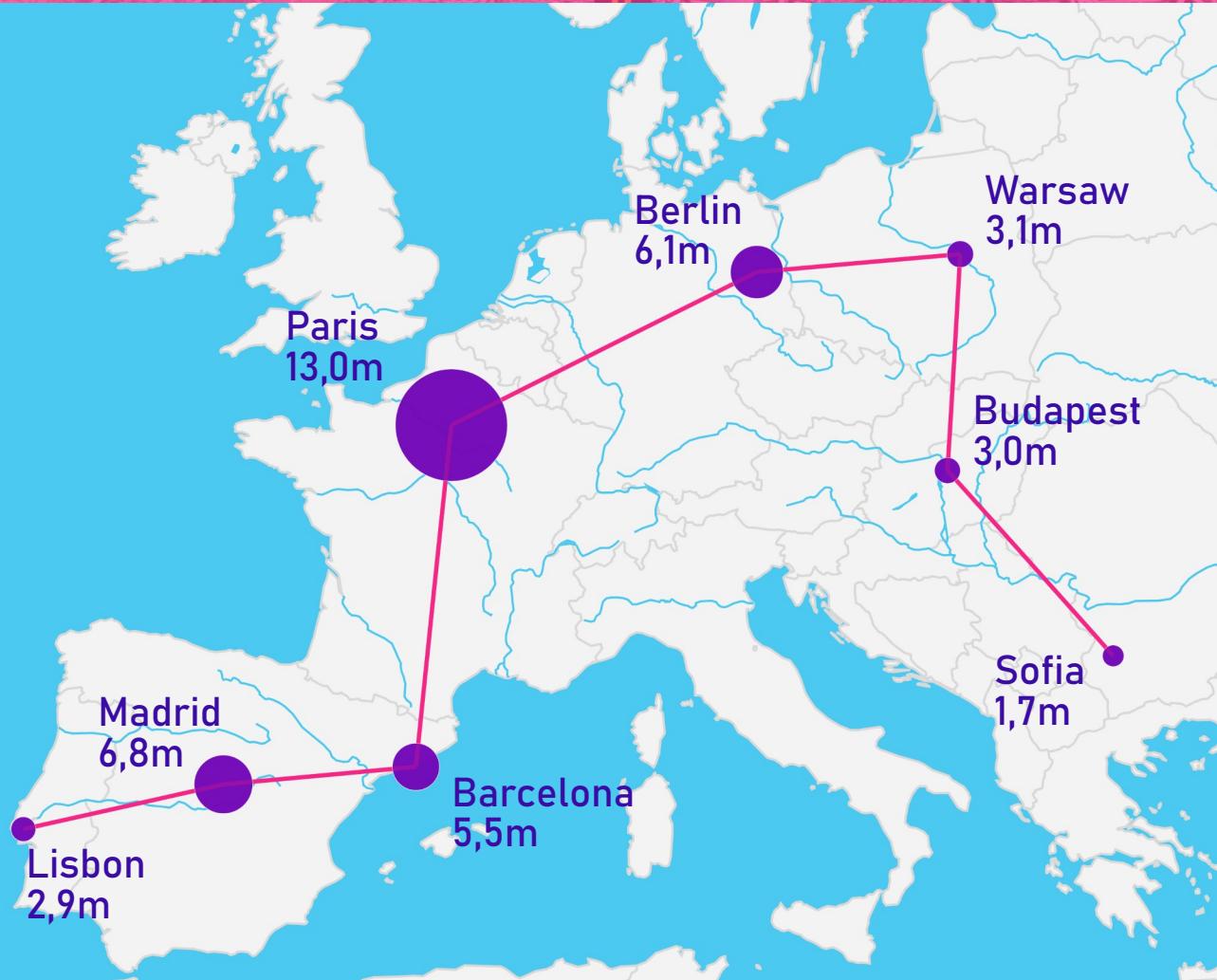
Rail facts:

413.924 Billion
Passenger/km in 2019

211.430 Km rail

Selected Itinerary

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Train Distance

- Lisbon-Madrid 1042.4 Km
- Madrid-Barcelona 630.5 Km
- Barcelona-Paris 1123.4 Km
- Paris-Berlin 1147.3 Km
- Berlin-Warsaw 568.8 Km
- Warsaw-Budapest 805.2 Km
- Budapest-Sofia 838.3 Km

Air Traffic



Lisbon

Continental passengers
12.071.234

Busiest route
Madrid 1.539.048

Air Traffic



Madrid

Continental passengers
19.997.134

Barcelona

Continental passengers
18.591.924

Busiest route
MAD - BCN 1.765.753

Air Traffic

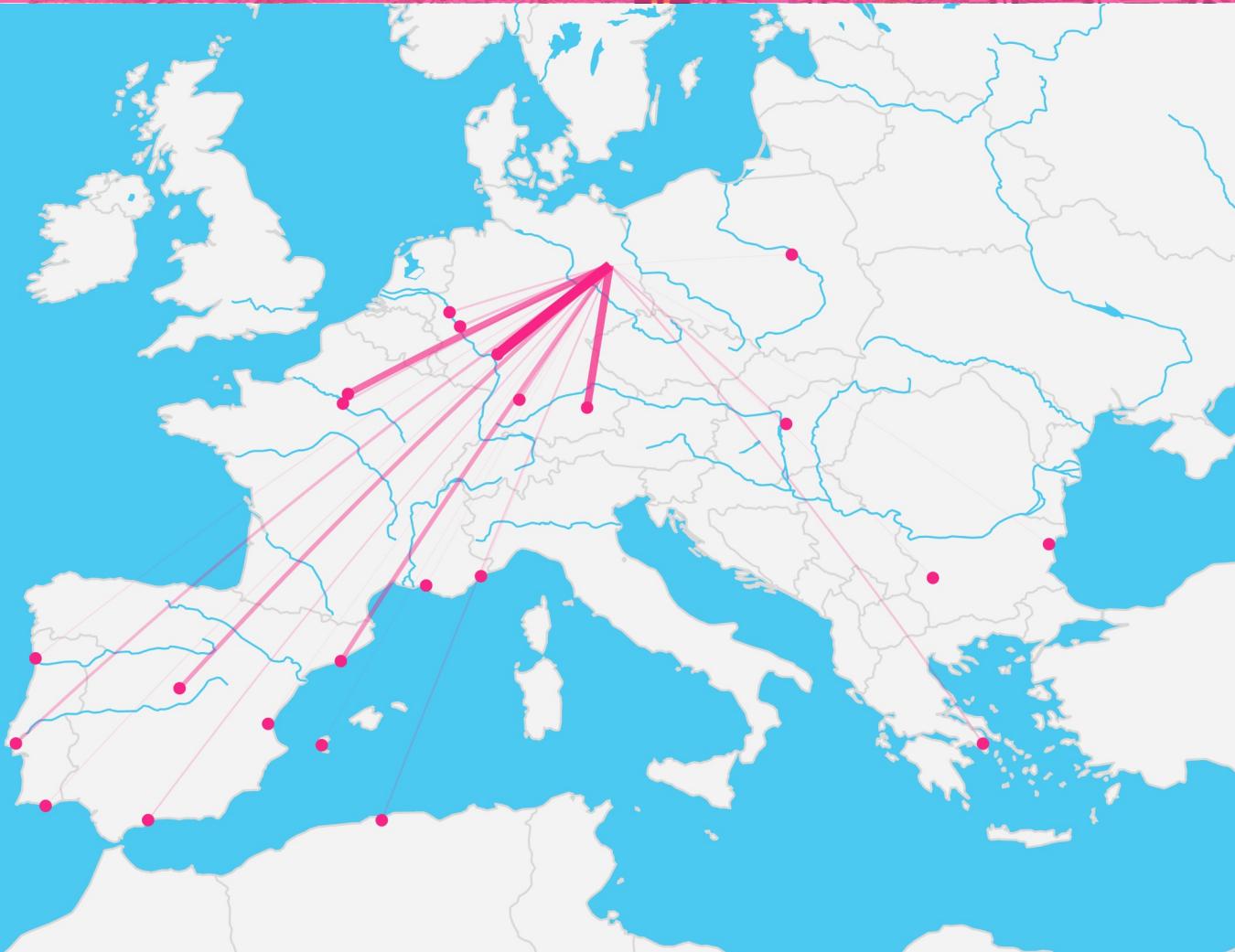


Paris

Continental passengers
15.373.712

Busiest route
Barcelona 1.099.903

Air Traffic

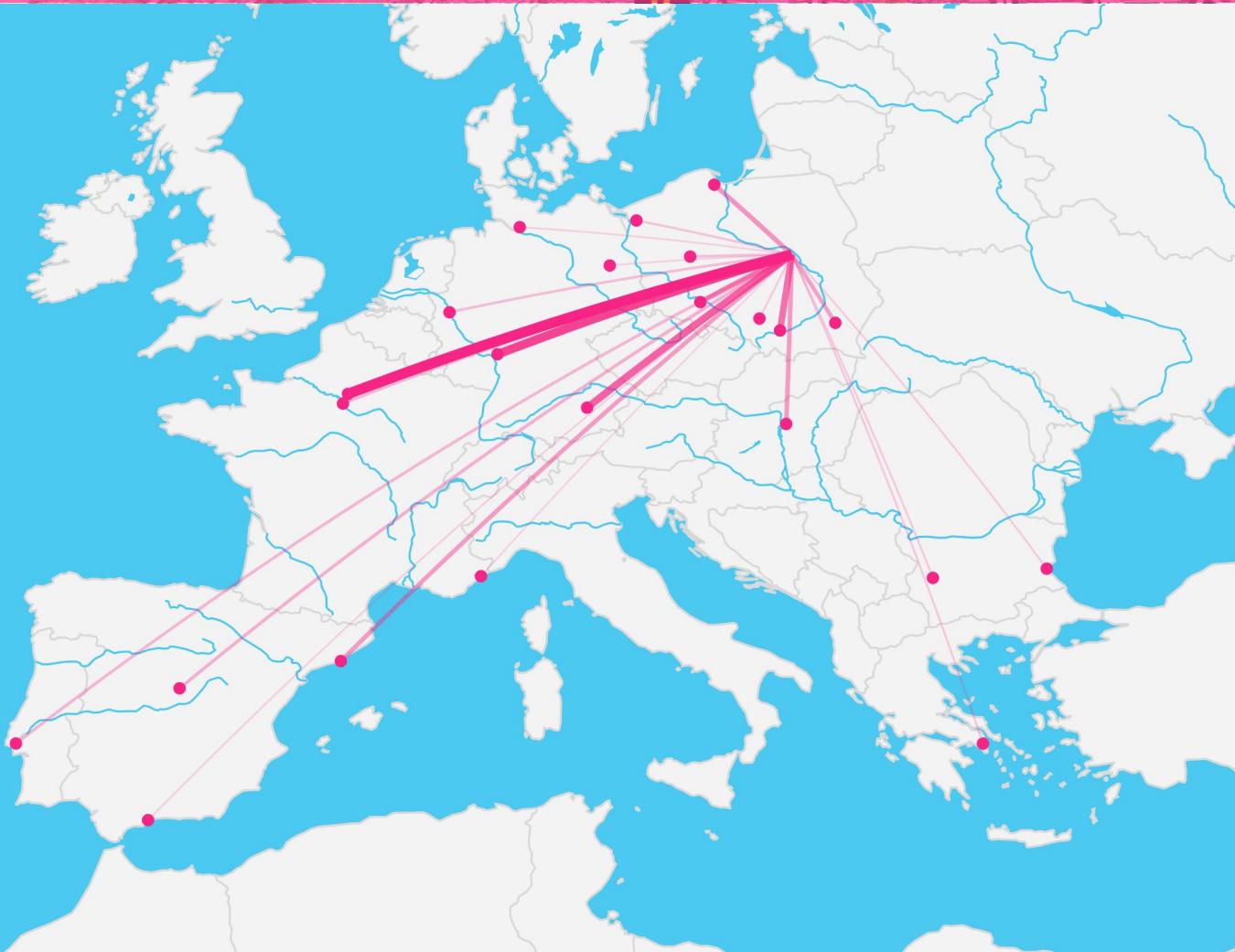


Berlin

Continental passengers
6.152.489

Busiest route
Frankfurt 1.018.072

Air Traffic



Warsaw

Continental passengers
3.876.257

Busiest route
Paris 452.323

Air Traffic



Budapest

Continental passengers
2.792.722

Busiest route
Frankfurt 352.572

Air Traffic

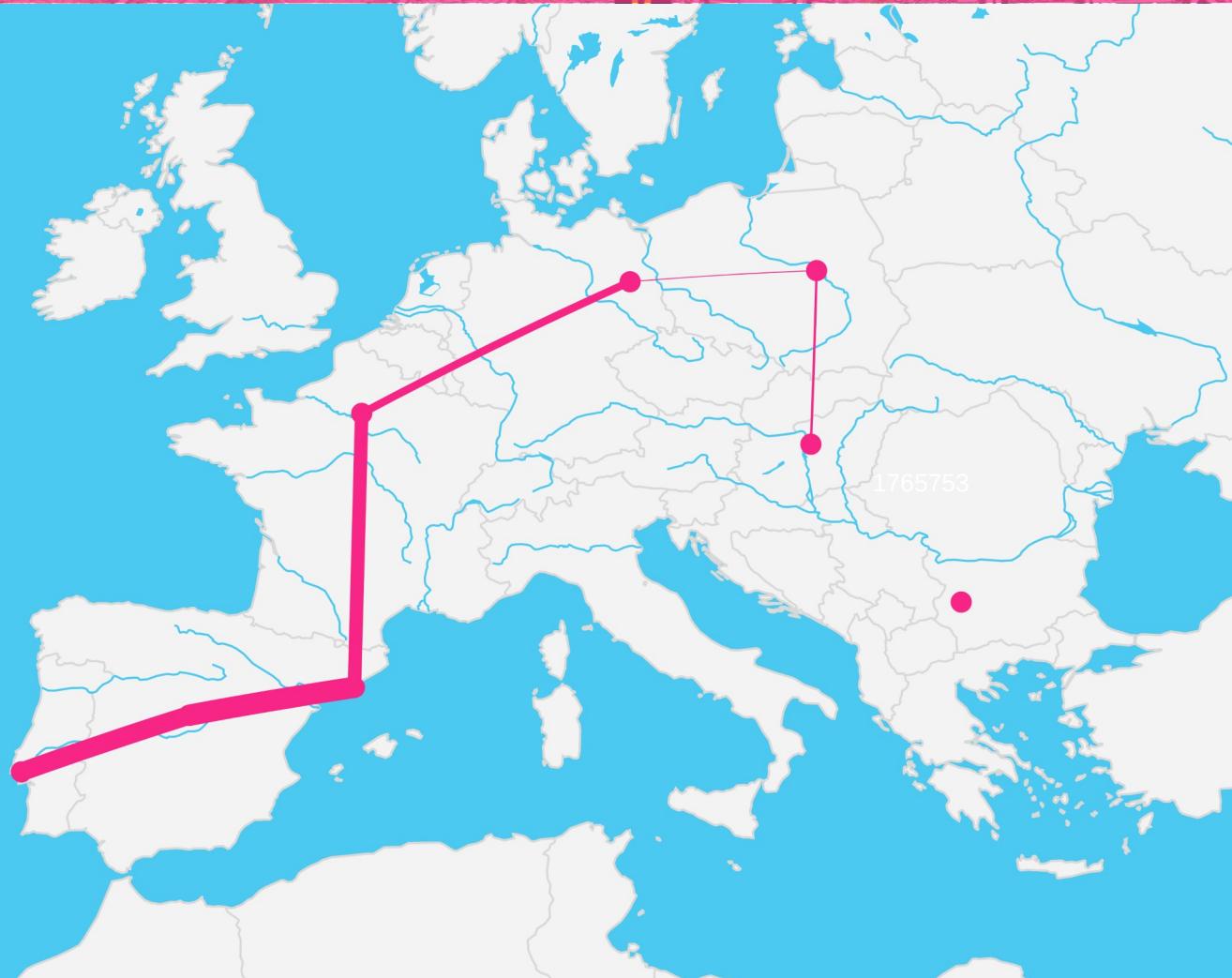


Sofia

Continental passengers
1.887.934

Busiest route
Frankfurt 277.286

Air Traffic



Air Connections

LPPT-LEMD 1.556.417

LEMD-LEBL 1.765.753

LEBL-LFPG 1.123.664

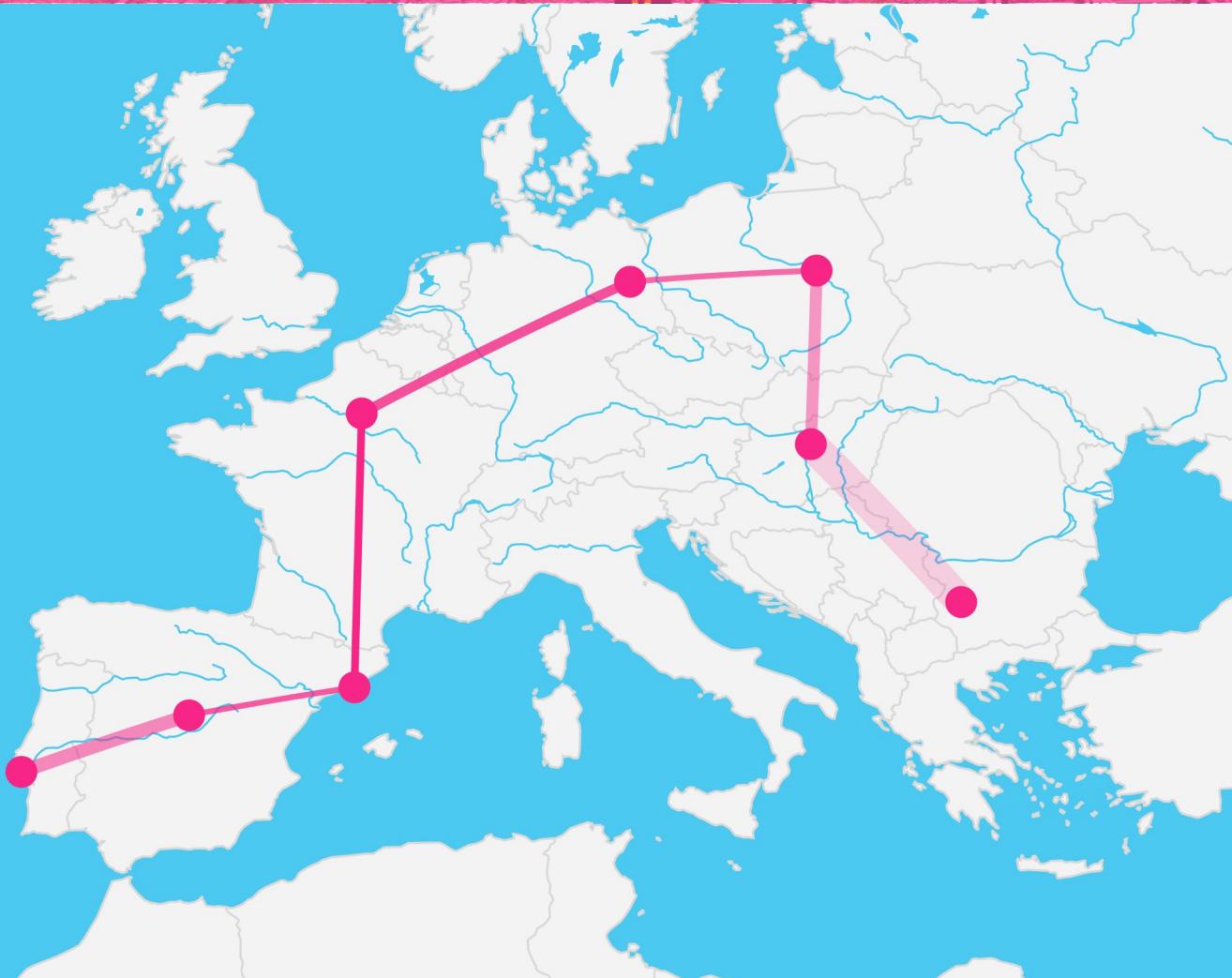
LFPG-EDDB 643.348

EDDB-EPWA 77.342

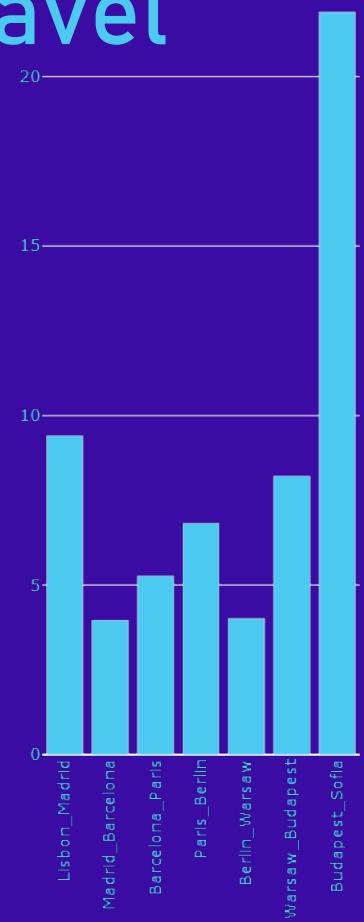
EPWA-LHBP 198.325

LHBP-LBSF 0

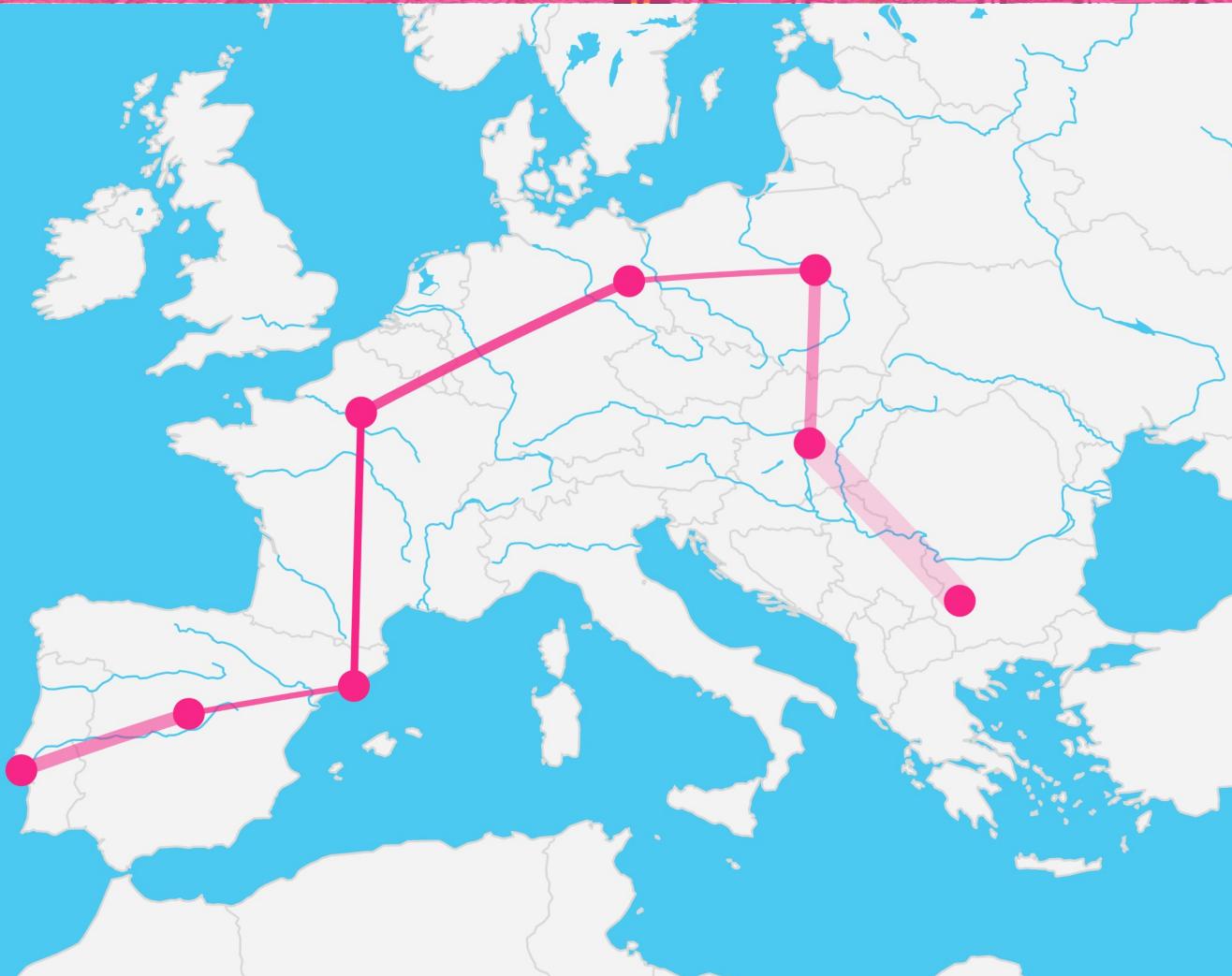
Rail Capacity



Rail Travel



Rail Capacity

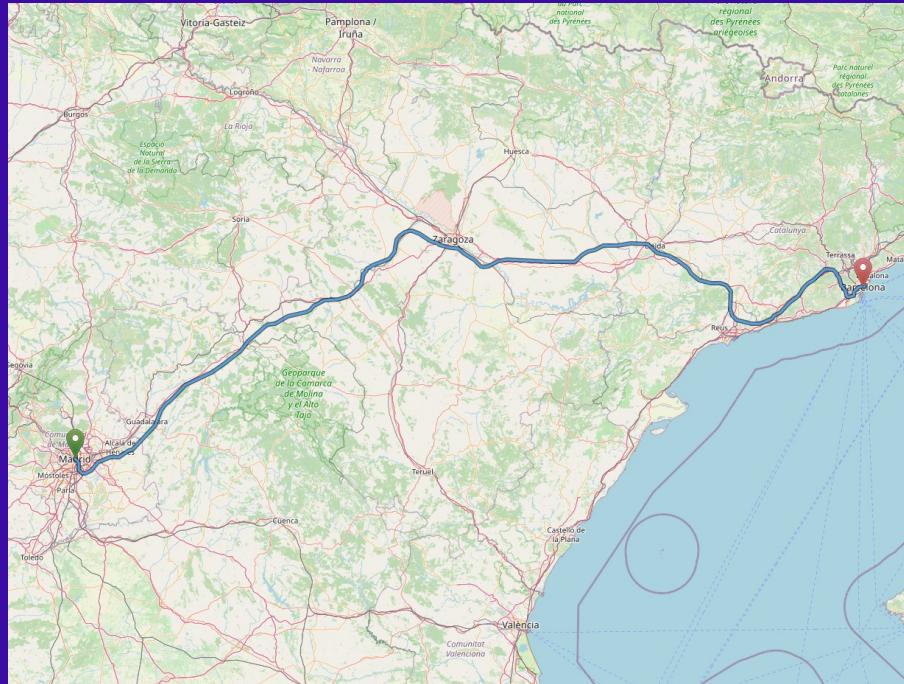


Daily Rail Service

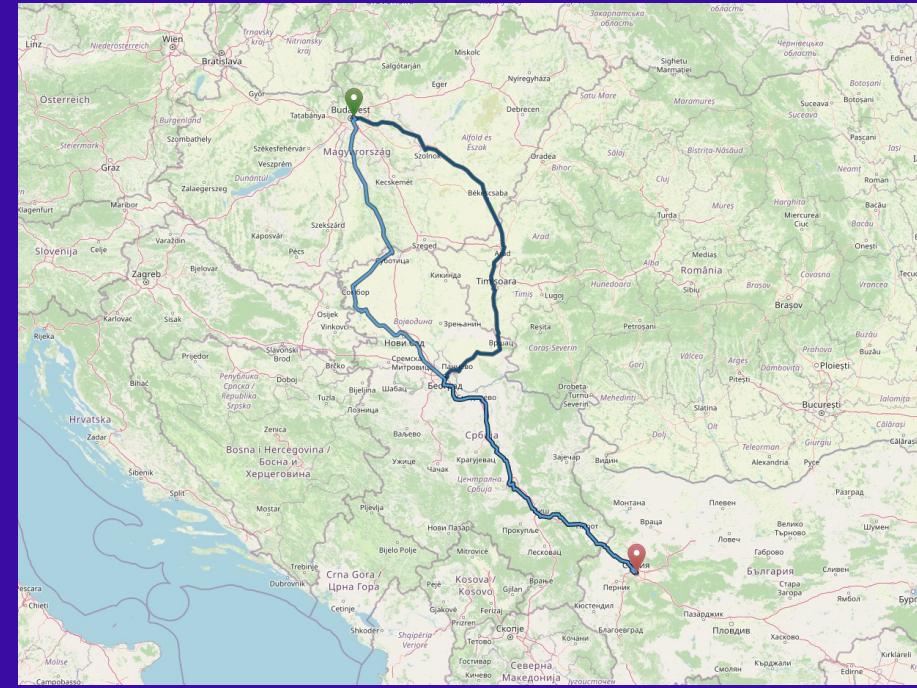
Madrid-Barcelona 35
Barcelona-Paris 13
Berlin-Warsaw 22
Warsaw-Budapest 7

Rail Capacity

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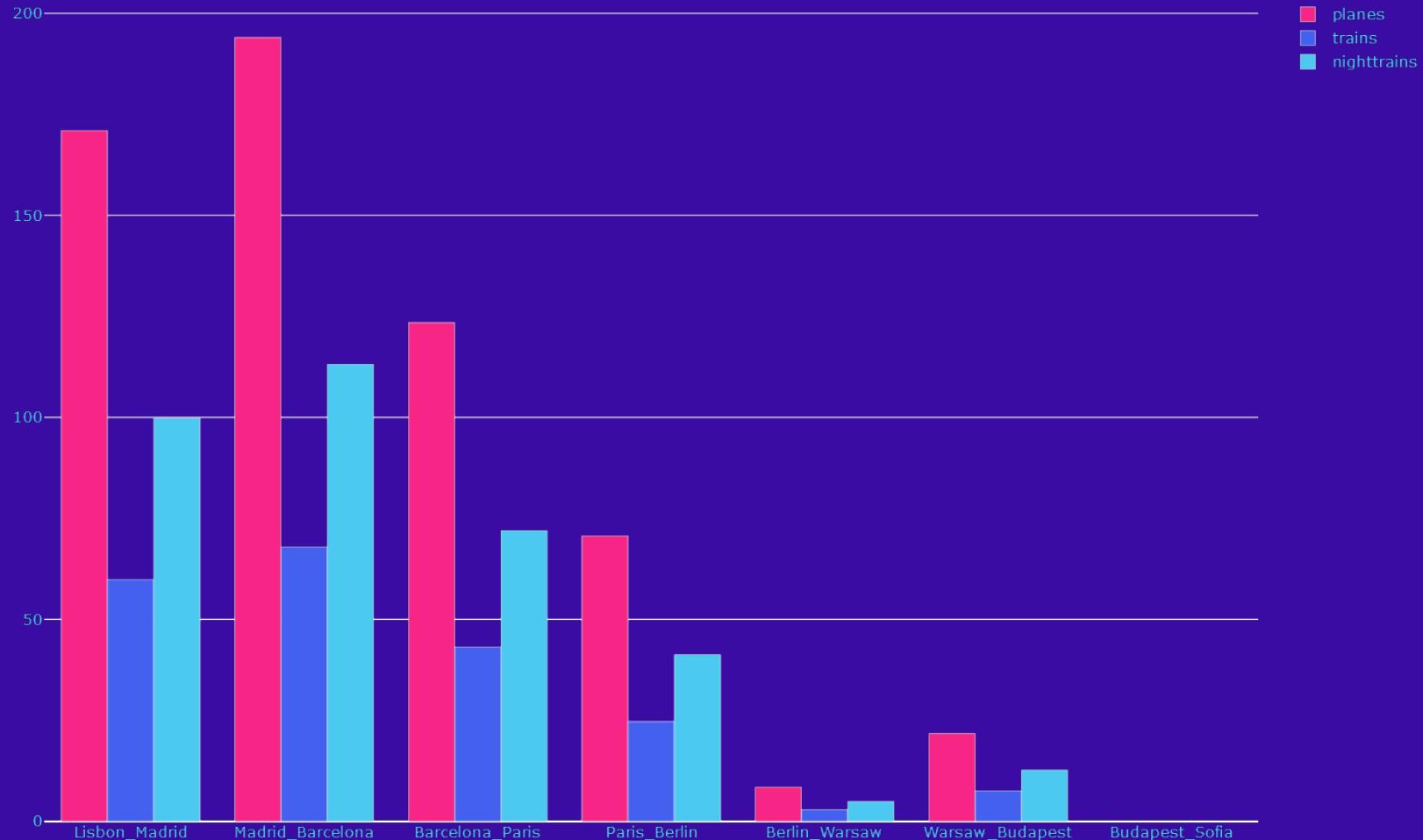
Madrid-Barcelona
Length: 630 Km
Duration: 3:58h (2:45h actual)



Budapest-Sofia
Length: 838 Km
Duration: 21:54h

Rail Capacity vs. Air Traffic

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Conclusions

- There's a lot of railway capacity to increase service on certain routes and regions
- Infrastructure needs to be improved to increase capacity accross borders as well as in the east
- Increasing production of rolling stock will help improve already serviced routes

Tools and Sources

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Tools

Python featuring:
Pandas
GeoPy
Plotly

Sources

Eurostat
Open Railway Map
Railway Routing