



# *A new accessibility indicator*

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# Overview

- *Why do we need a new accessibility indicator?*
- *Measuring inter-regional road and rail transport performance for the EU*
- *Measuring local walking, cycling, driving and public transport performance at the city and FUA scale*
- *Conclusions*



# Traditional accessibility indicators

**Absolute  
accessibility**

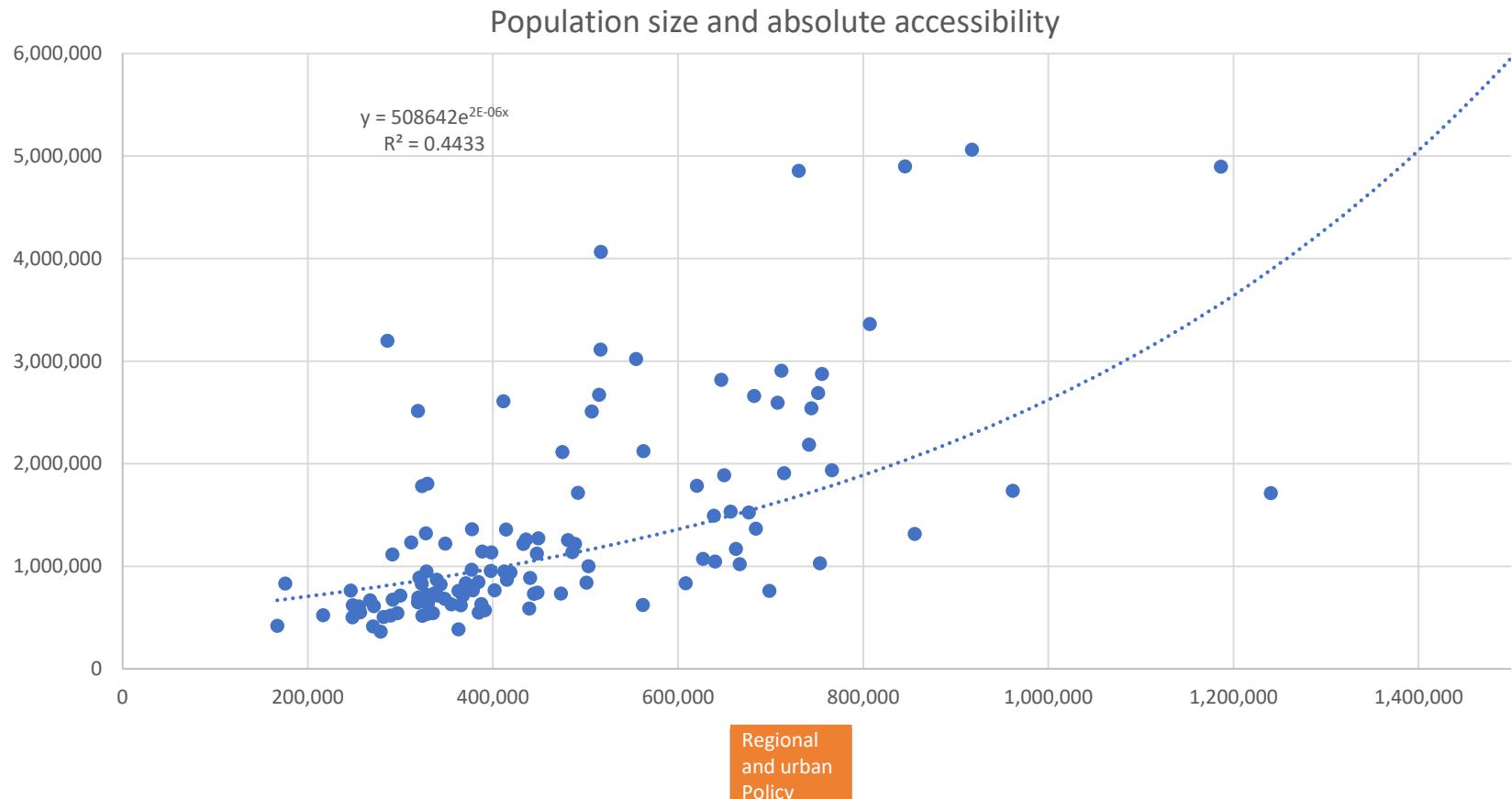
Number destinations  
that can be reached in x minutes per mode

**Relative  
accessibility**

Share of all destinations in a FUA or region  
that can be reached in x minutes per mode.

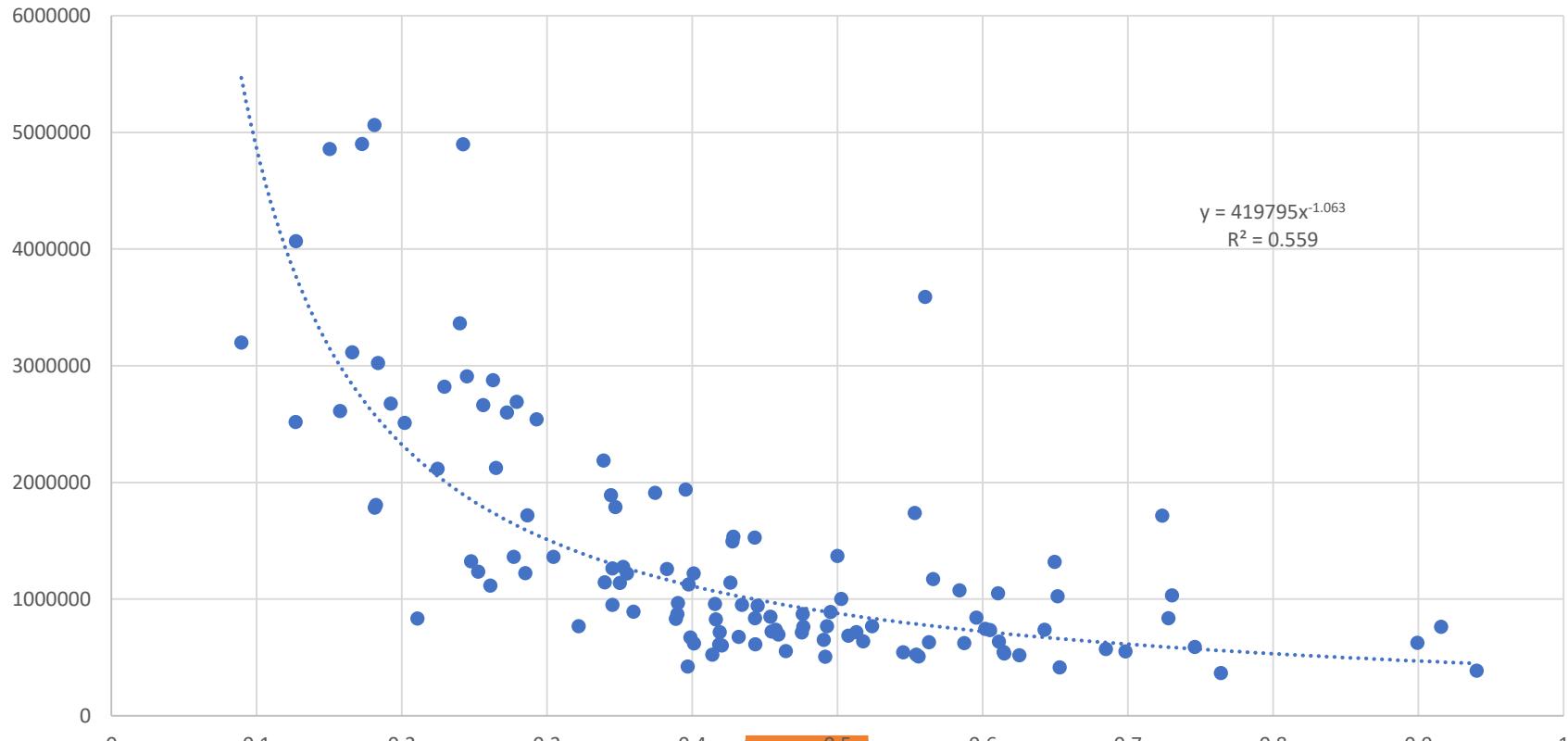
- *Measures the goal of mobility (not the means)*
- *Captures the combined impact of the transport network and the spatial distribution of origins and destinations*

# But absolute accessibility favours big functional urban areas



# And relative accessibility favours small functional urban areas

Population size and relative accessibility





# Capture transport performance by excluding destination distribution

<b>Absolute accessibility</b>	Number of destinations that can be reached in <b>x</b> minutes
<b>Proximity</b>	Number of destinations located within a radius of <b>x</b> km
<b>Transport performance</b>	Absolute accessibility / proximity

***Destinations that can be reached in x minutes / Destinations located within a radius of x km***



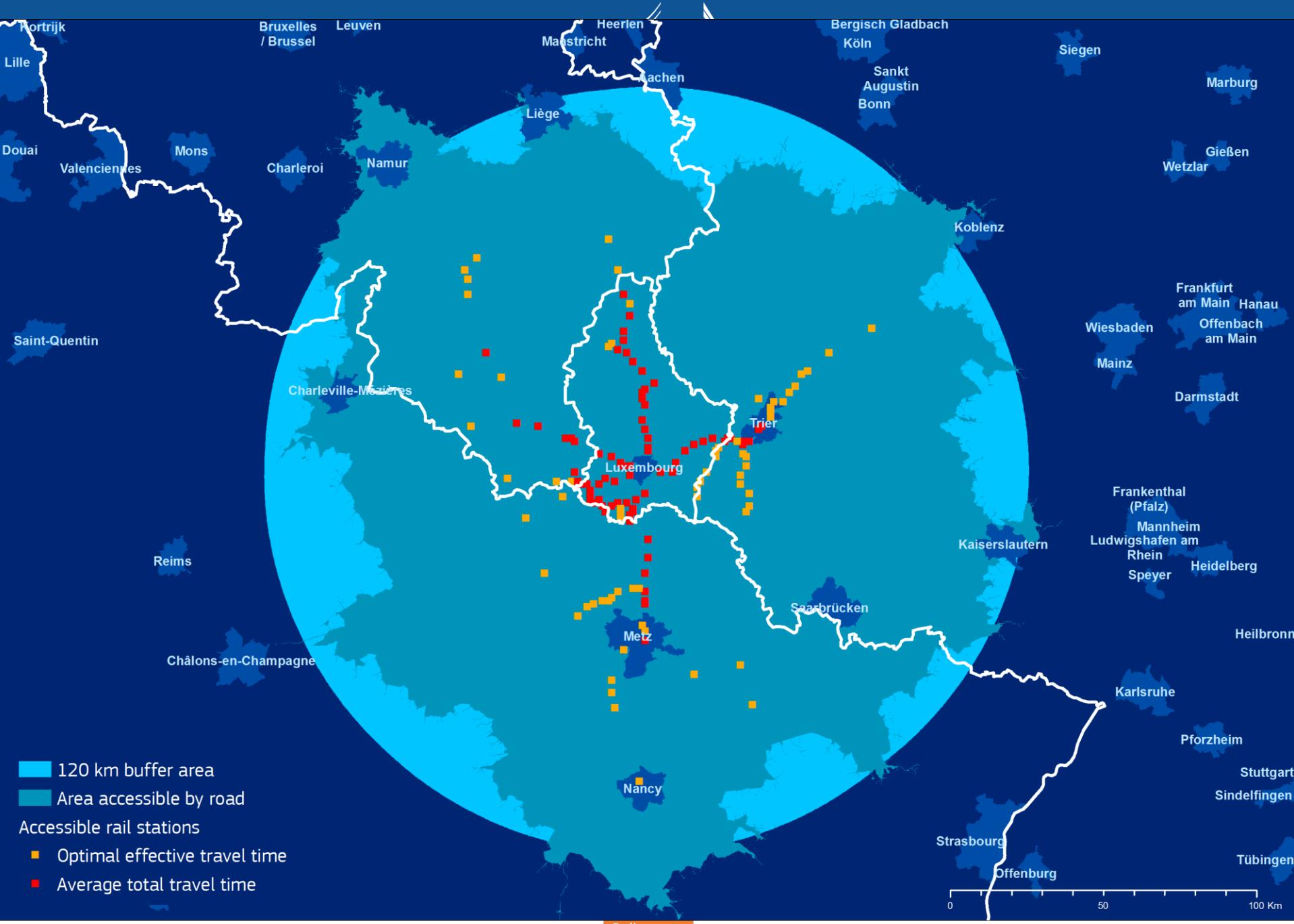
# Transport performance

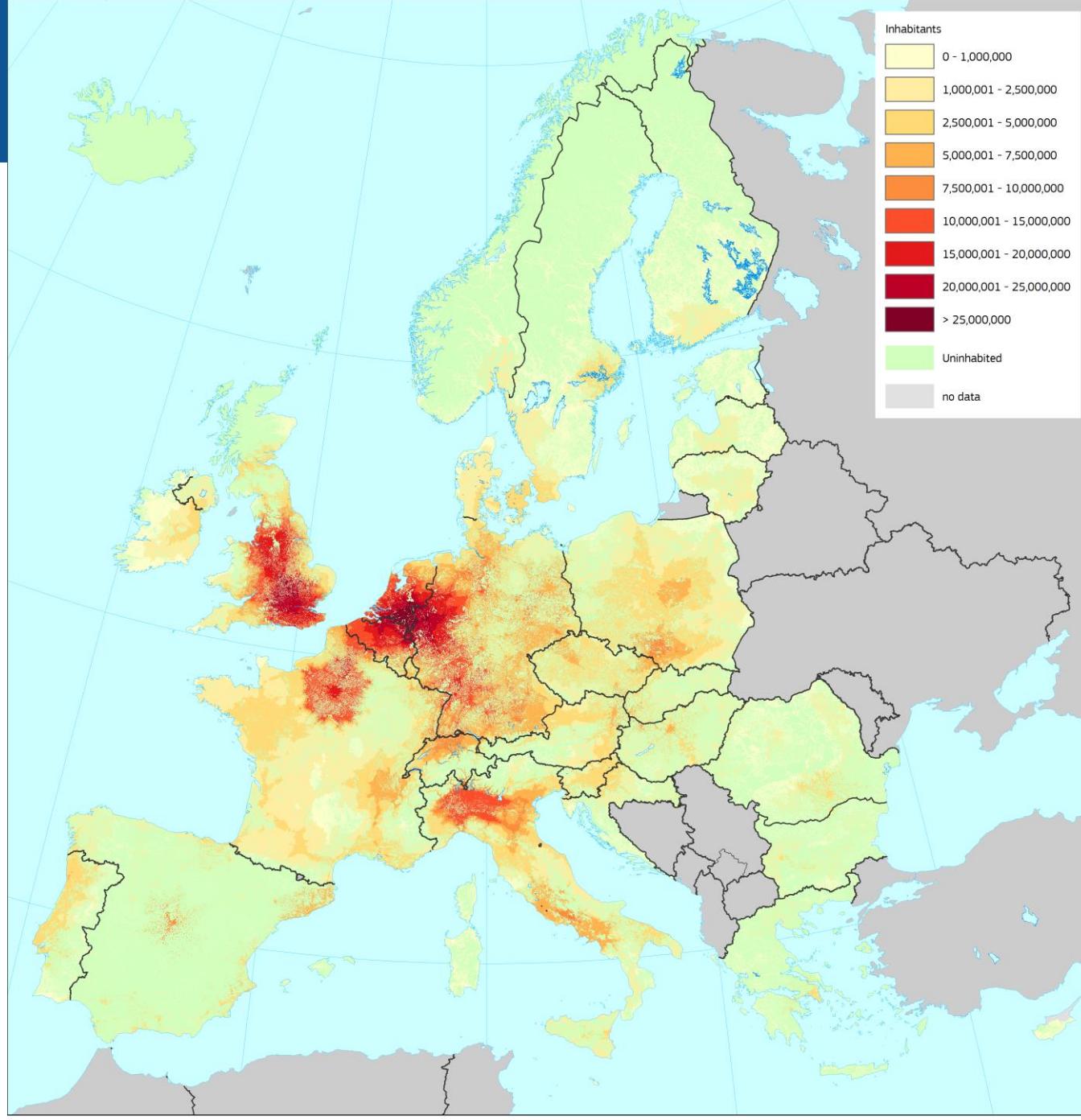
- *Is not biased by settlement size*
- *It can show whether access is high due to the proximity of origins and destinations and/or due to a strong transport performance*
- *Can be used at multiple geographic scales: city, FUA, degree of urbanisation, regions ...*
- *Can be used for inter-regional and local access*



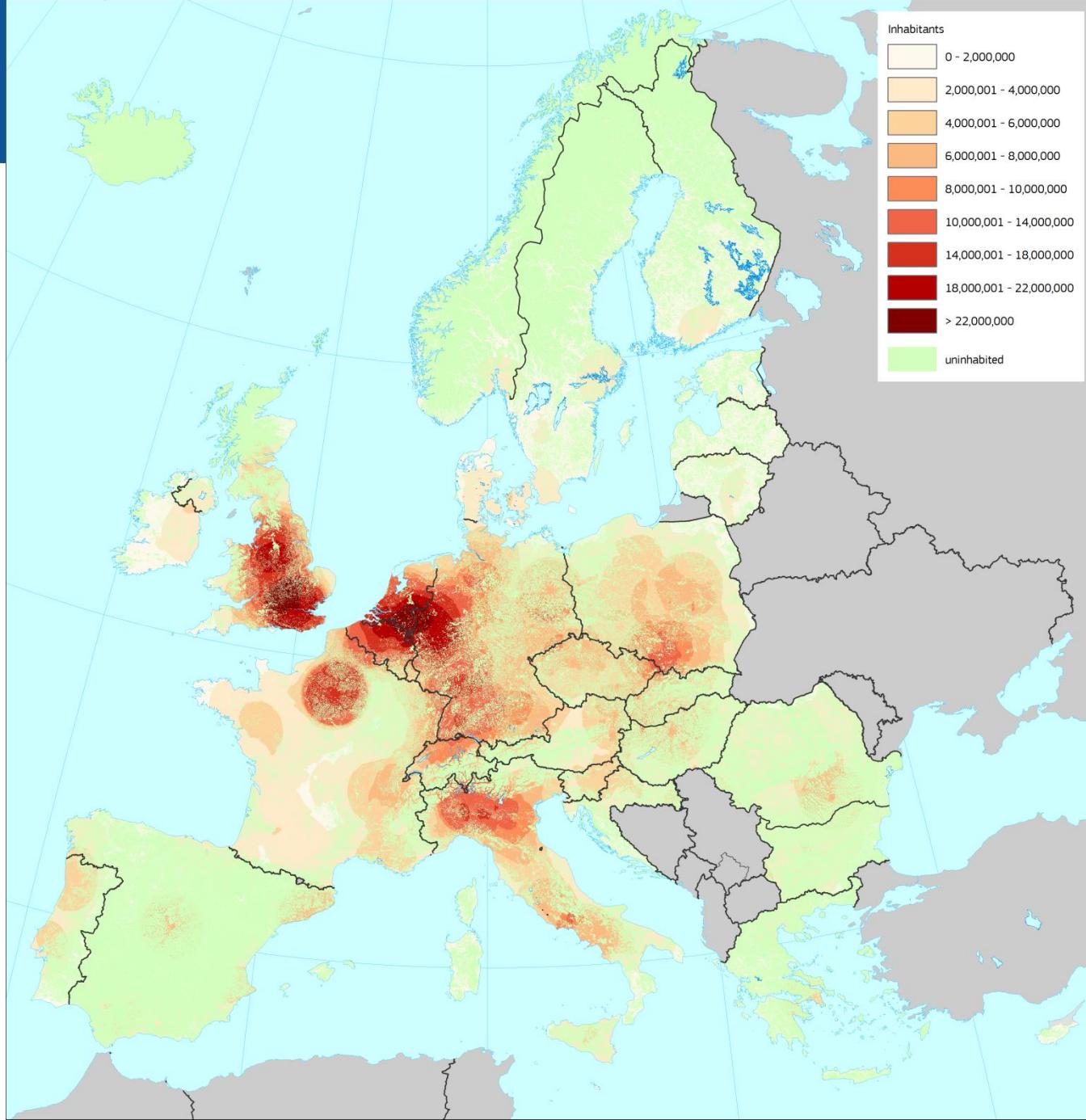
# Inter-regional road passenger transport performance

- *Accessible population = population that can be reached within 1h30 by road*
- *Accessibility relative to the population living in the surroundings (120 km radius)*
- *Basic units of analysis: grid cells of 1 km<sup>2</sup>, excluding the non-populated cells (GEOSTAT)*
- *Aggregate results are the population weighted average results of all cells in the reporting unit*

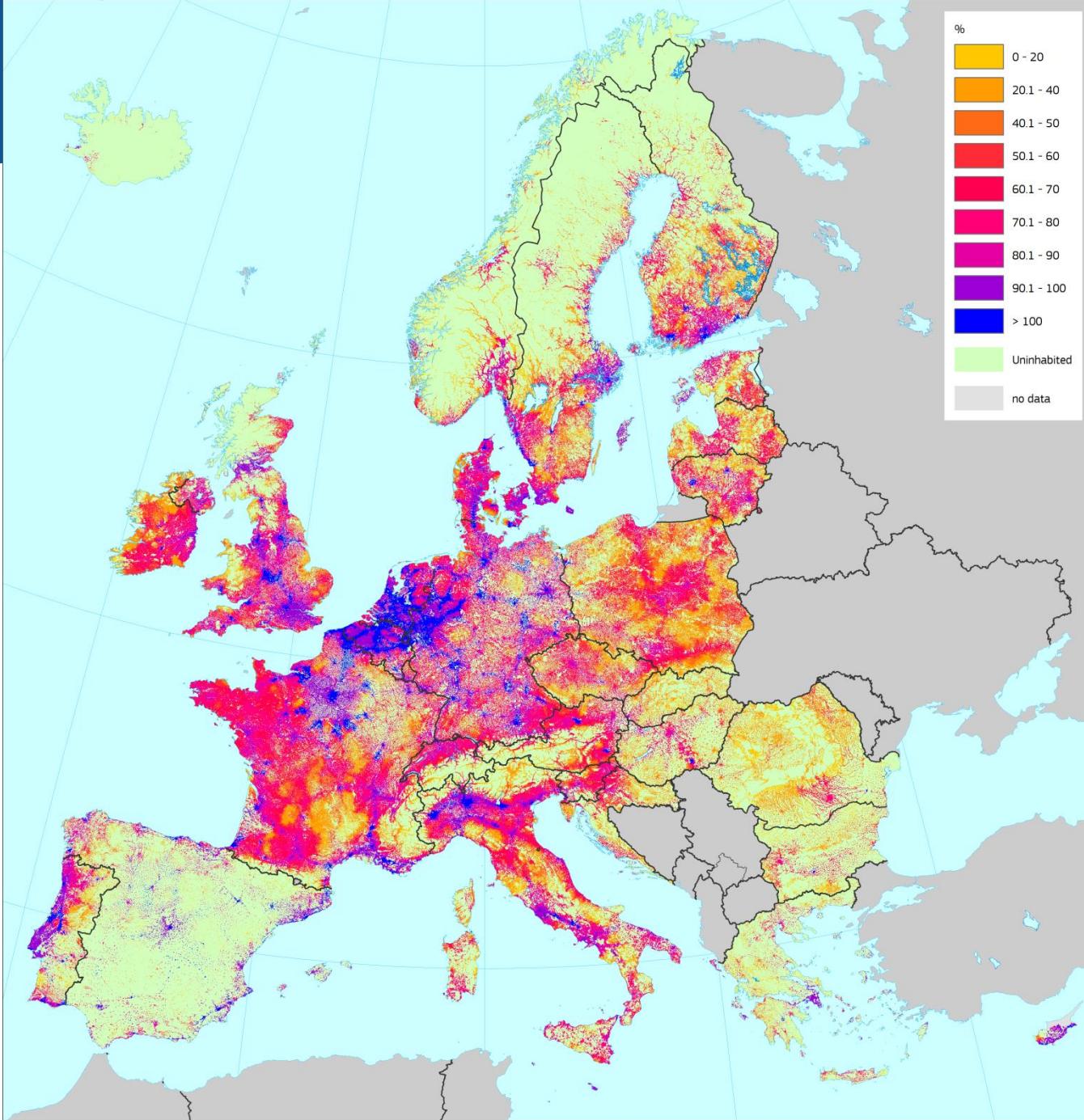


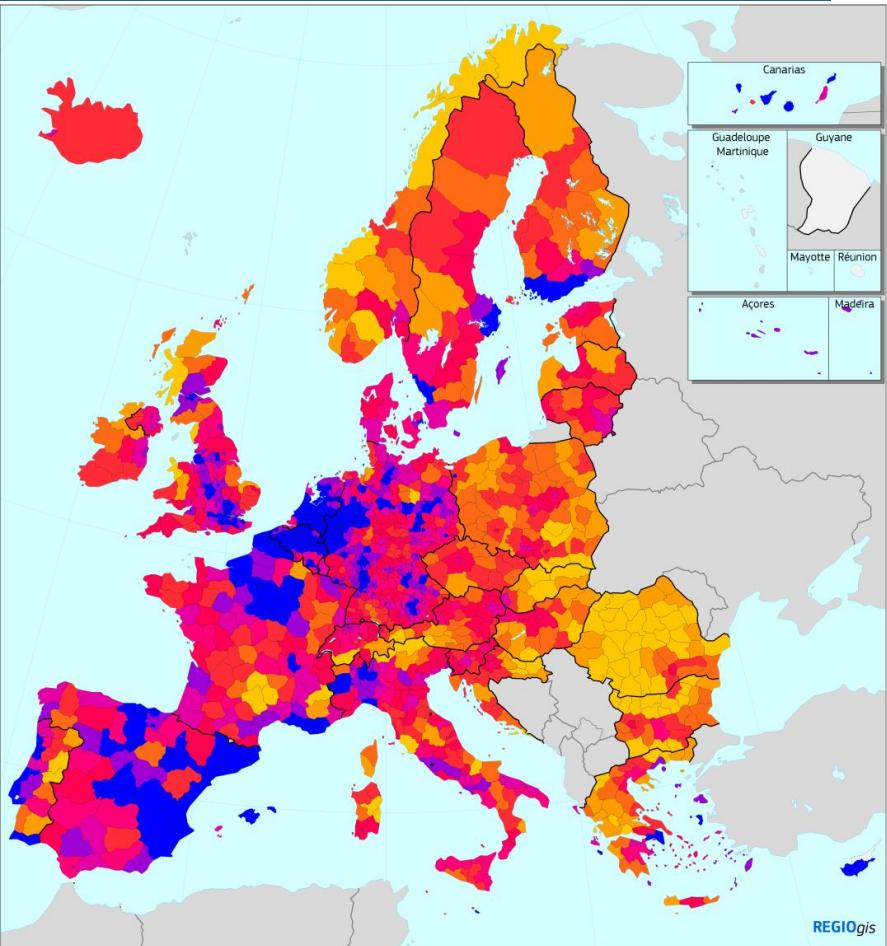


Population accessible within 1h30 by road

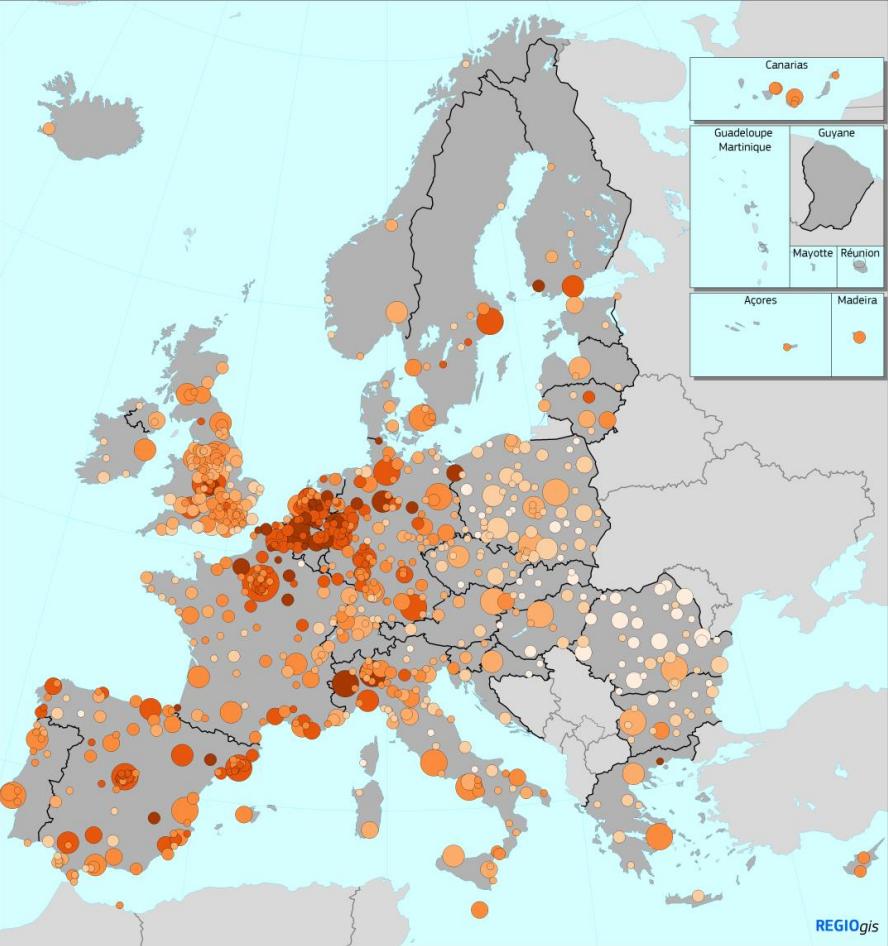


Population in a neighbourhood of 120 km around populated 1 km<sup>2</sup> grid cells, 2011



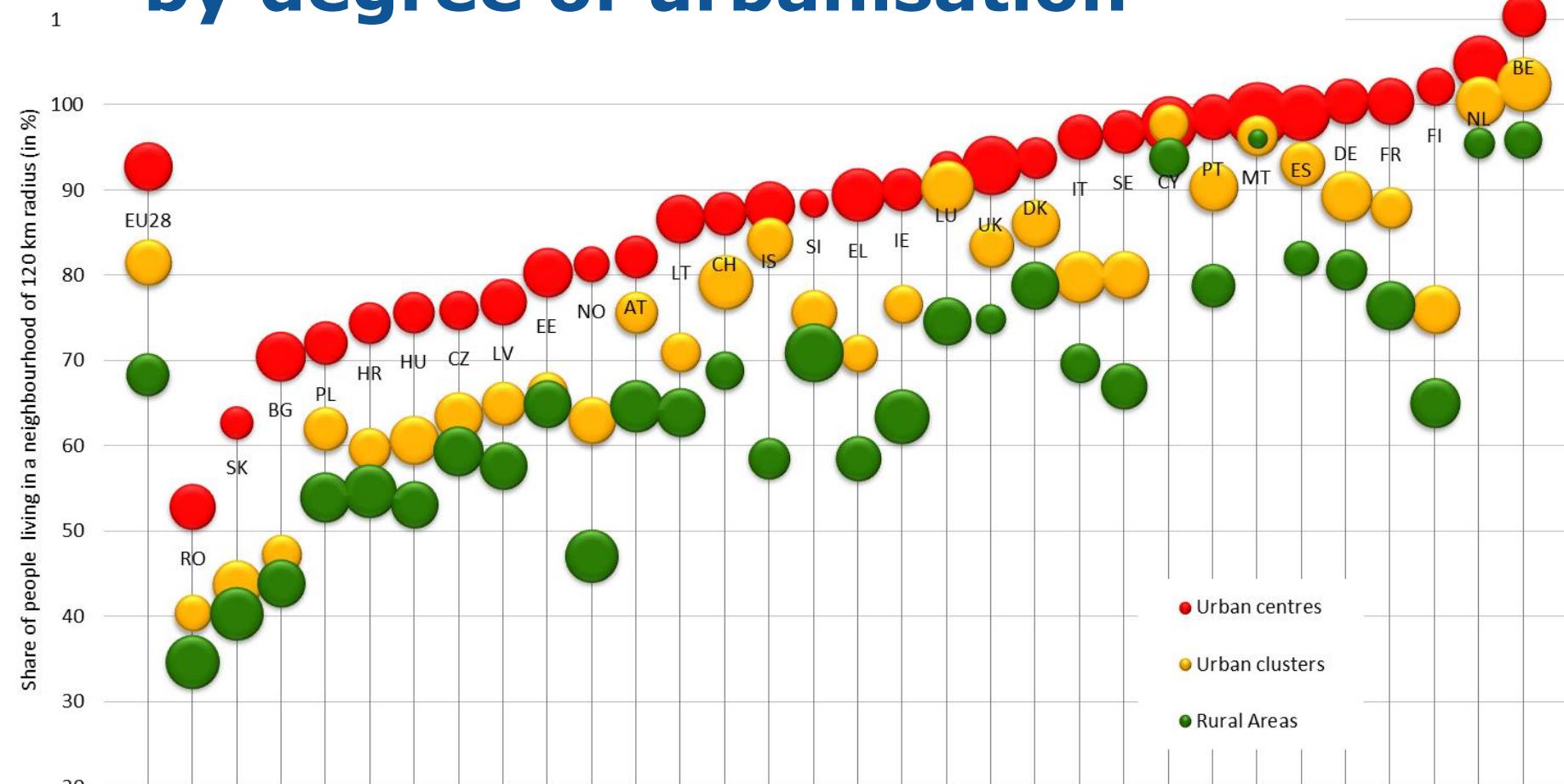


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# Road transport performance by degree of urbanisation

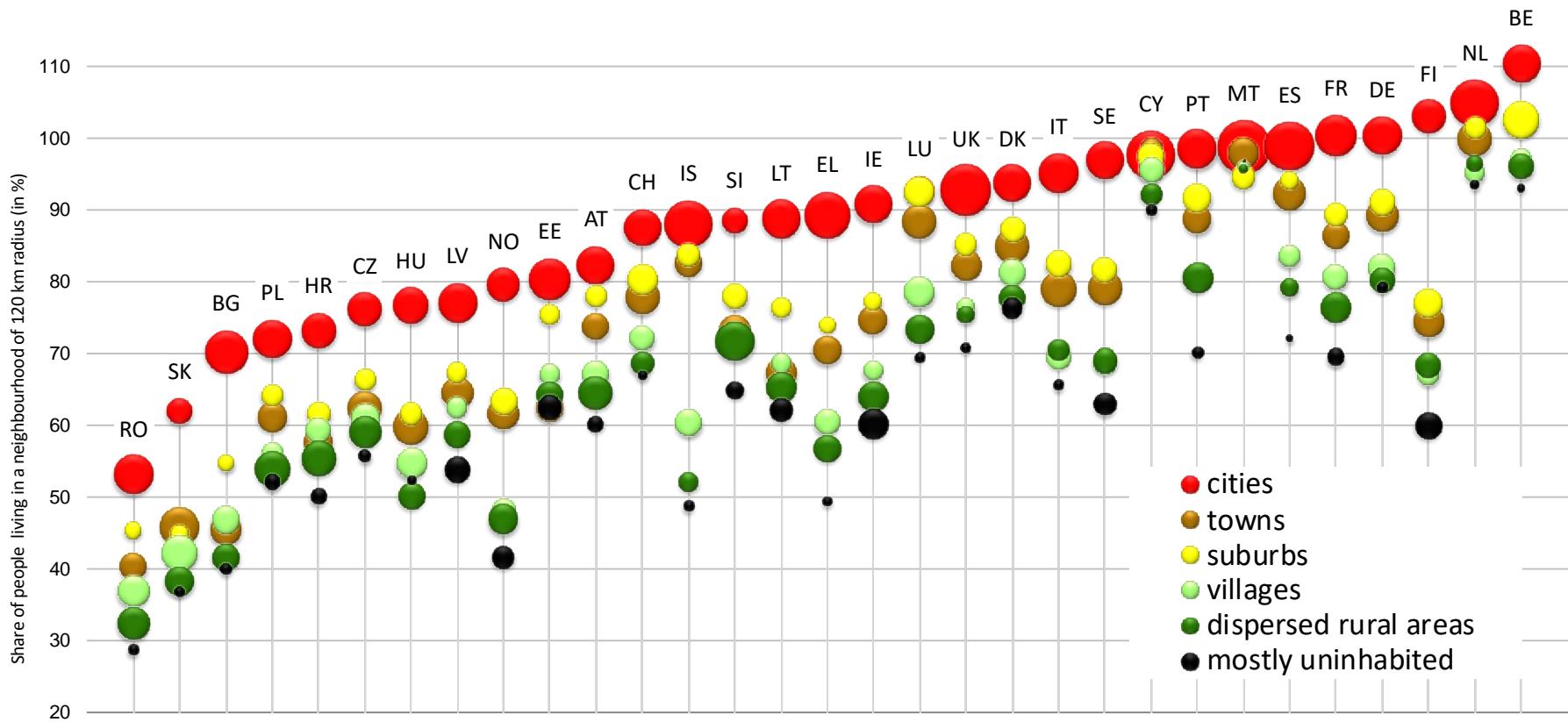


Note: Countries ranked by the value of urban centres

Source: REGIO-GIS

Bubble size is the share of national population living in the area

# Road passenger transport performance by degree of urbanisation level 2



Note: Countries ranked by the value of cities

Source: REGIO-GIS

Bubble size is the share of national population living in the area



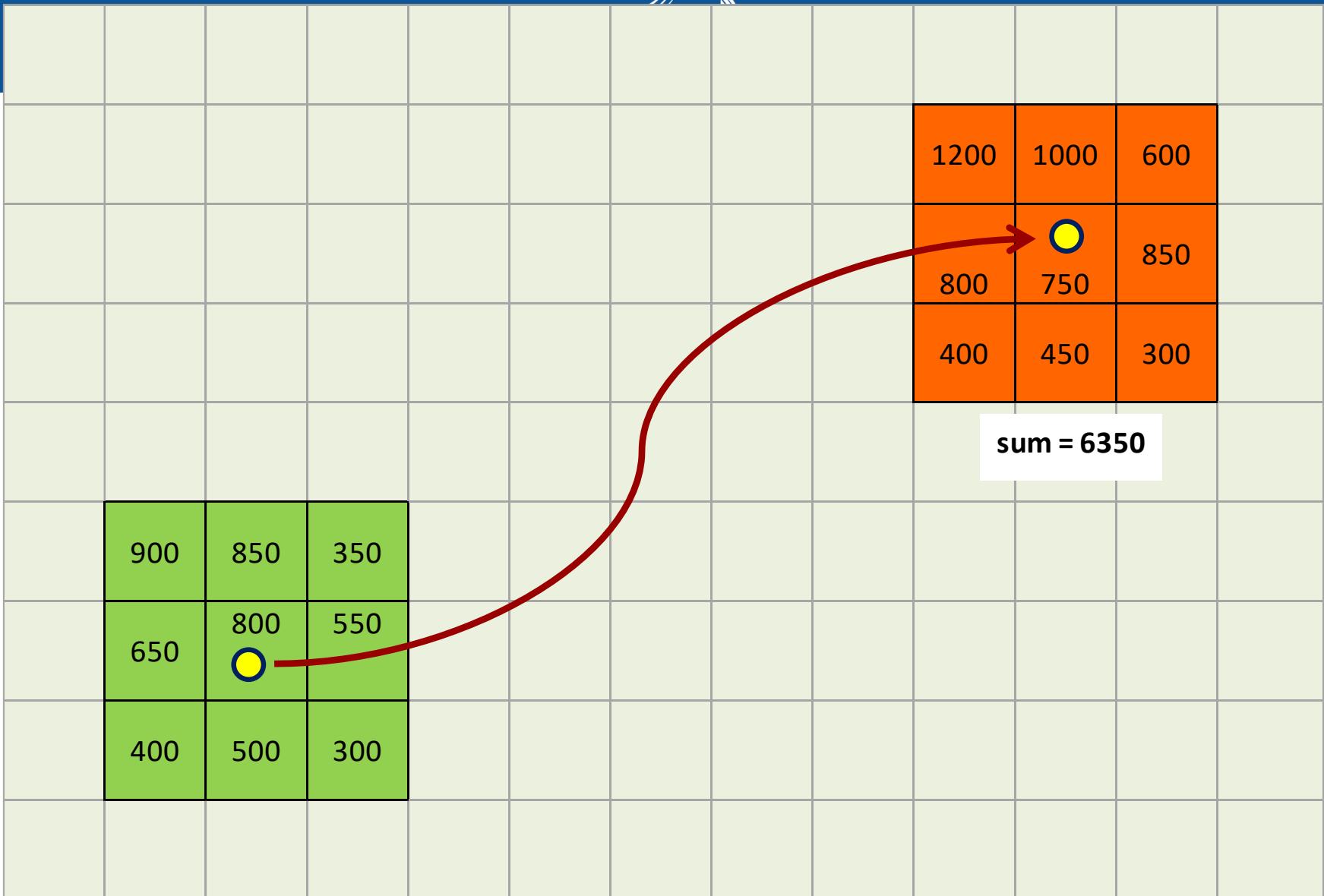
# Inter-regional rail passenger transport performance, 2014

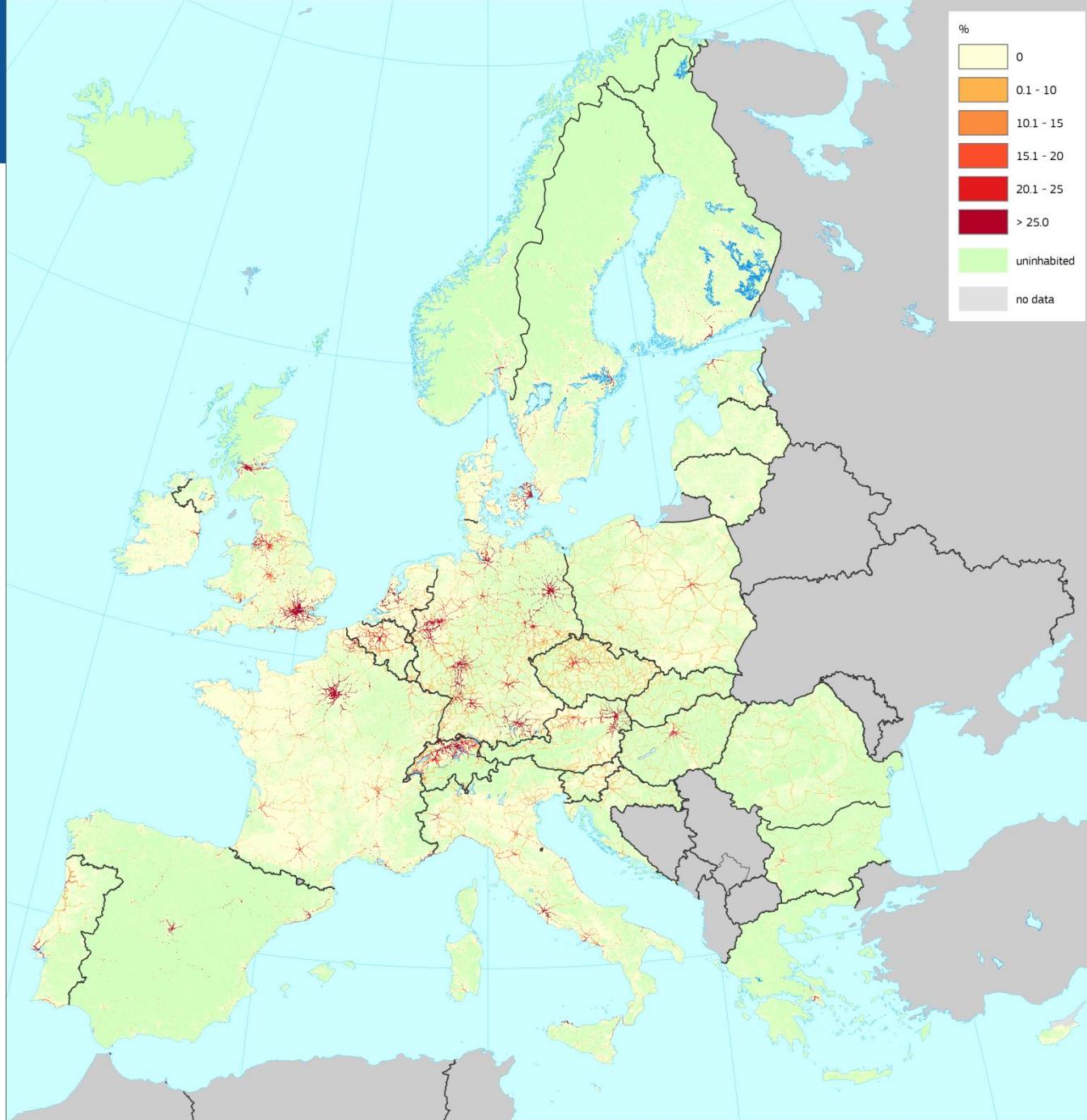
- *Population accessible within 1h30 by rail*
  - Full rail timetables for a typical weekday
  - From every station to every station
  - Travel times are computed during peak hours
- *Relative to the population living in the surroundings (120 km radius)*
- *Two options: optimal travel time (shown), average day-time travel time (not-shown)*



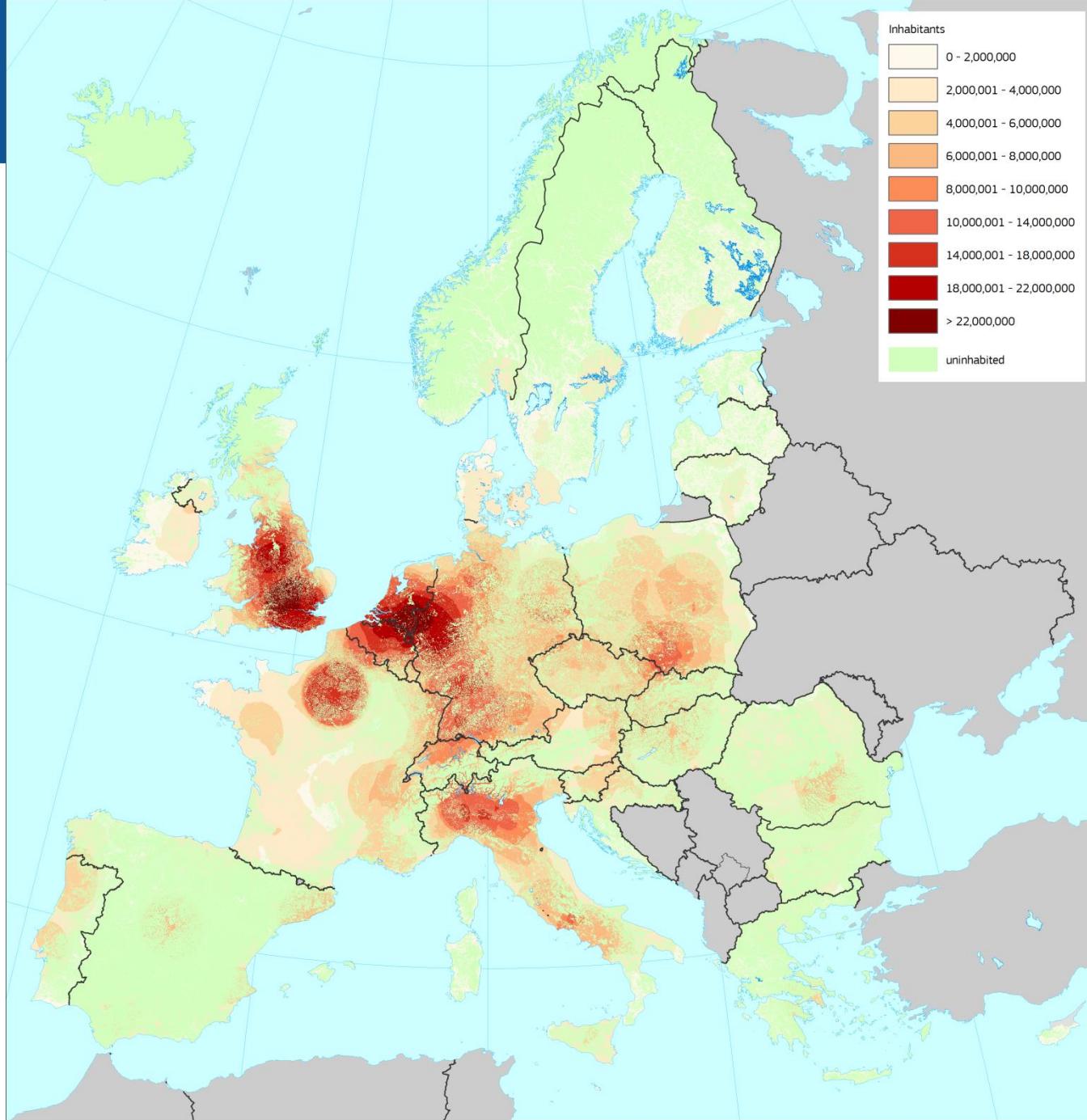
# Rail accessibility

- *Determining the accessible population at grid cell level*
  - **1 km<sup>2</sup> grid cells in a 3x3 km zone around a station "inherit" the travel time accessibility of that station**
- *For each grid cell near a station we compute the total population of all grid cells located nearby destination stations that can be reached within 1h30*

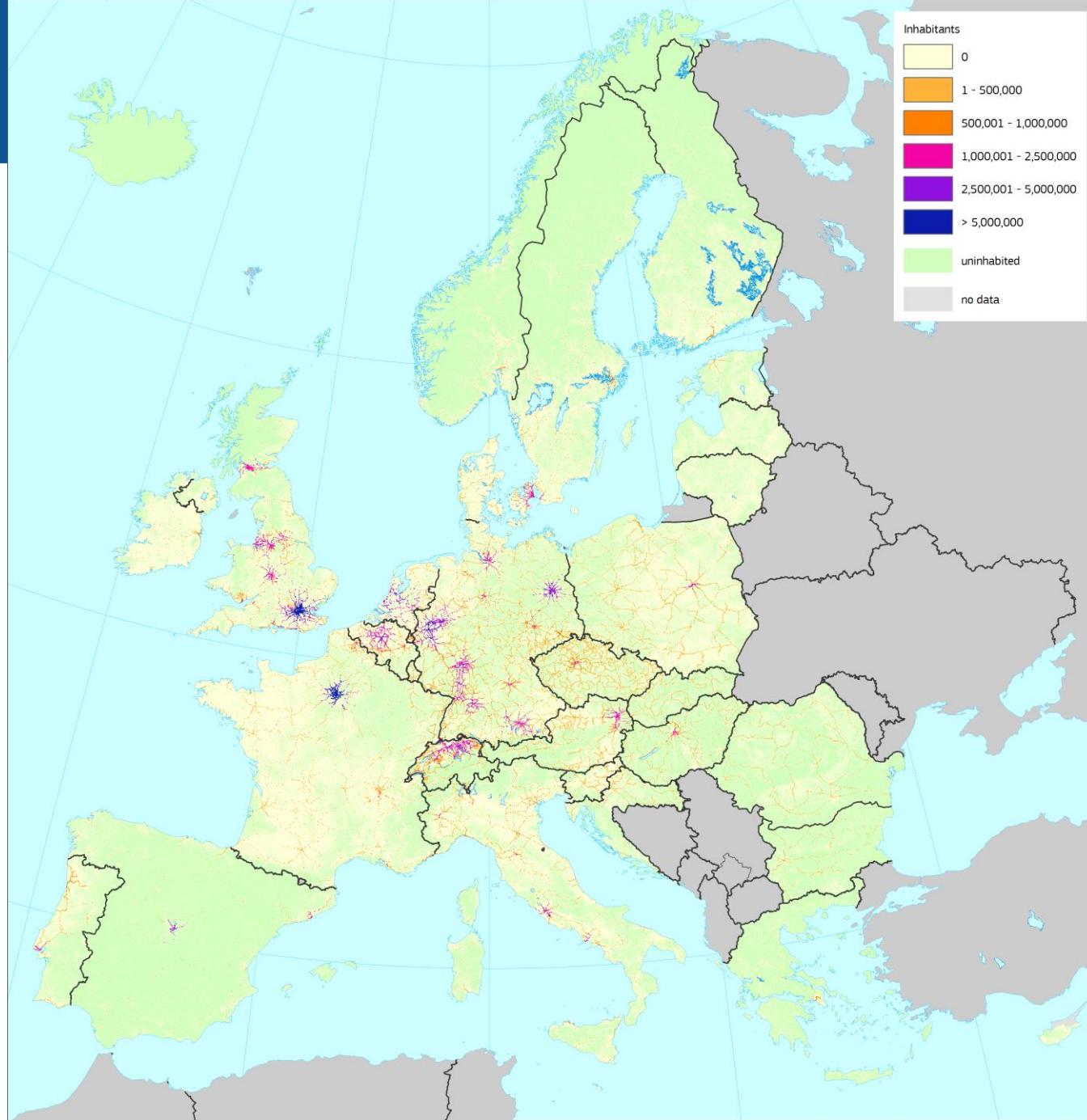




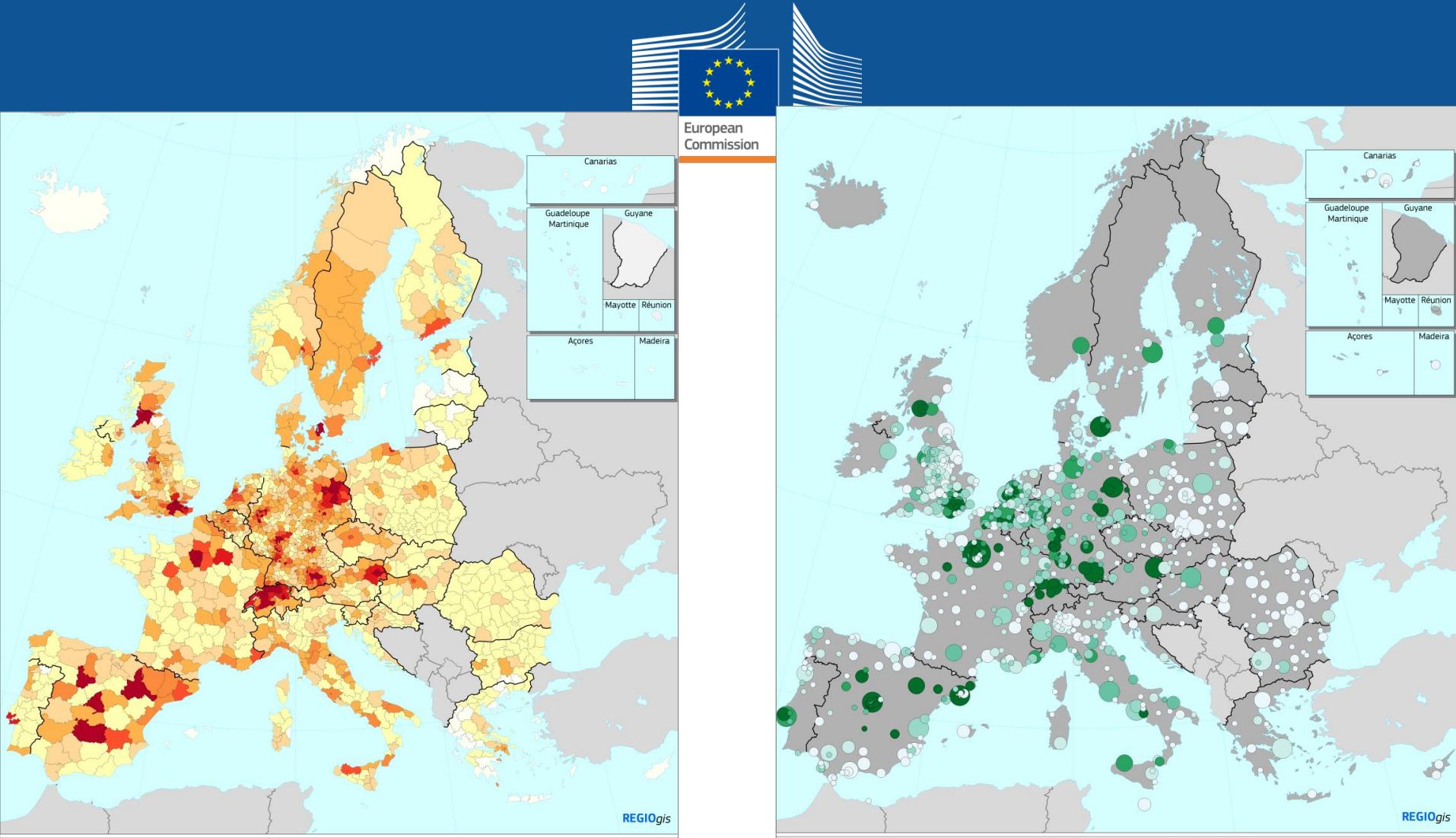
Population accessible within 1h30 by rail (optimal travel time), as share of population in a neighbourhood of 120 km radius



Population in a neighbourhood of 120 km around populated 1 km<sup>2</sup> grid cells, 2011

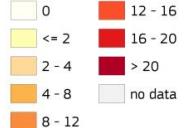


Population accessible within 1h30 by rail (average total travel time)



### Population accessible within 1h30 by rail (optimal travel time)

% of population in a 120 km neighbourhood



Accessibility using optimal trips available for departure during morning and evening peak hours.

Sources: REGIO-GIS, UIC, railway operators, Eurostat, TomTom

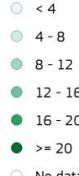
0 500 km

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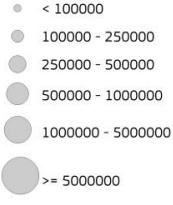
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### Population accessible within 1h30 by rail (optimal travel time), 2014

% of population within 120 km radius



Urban centre population



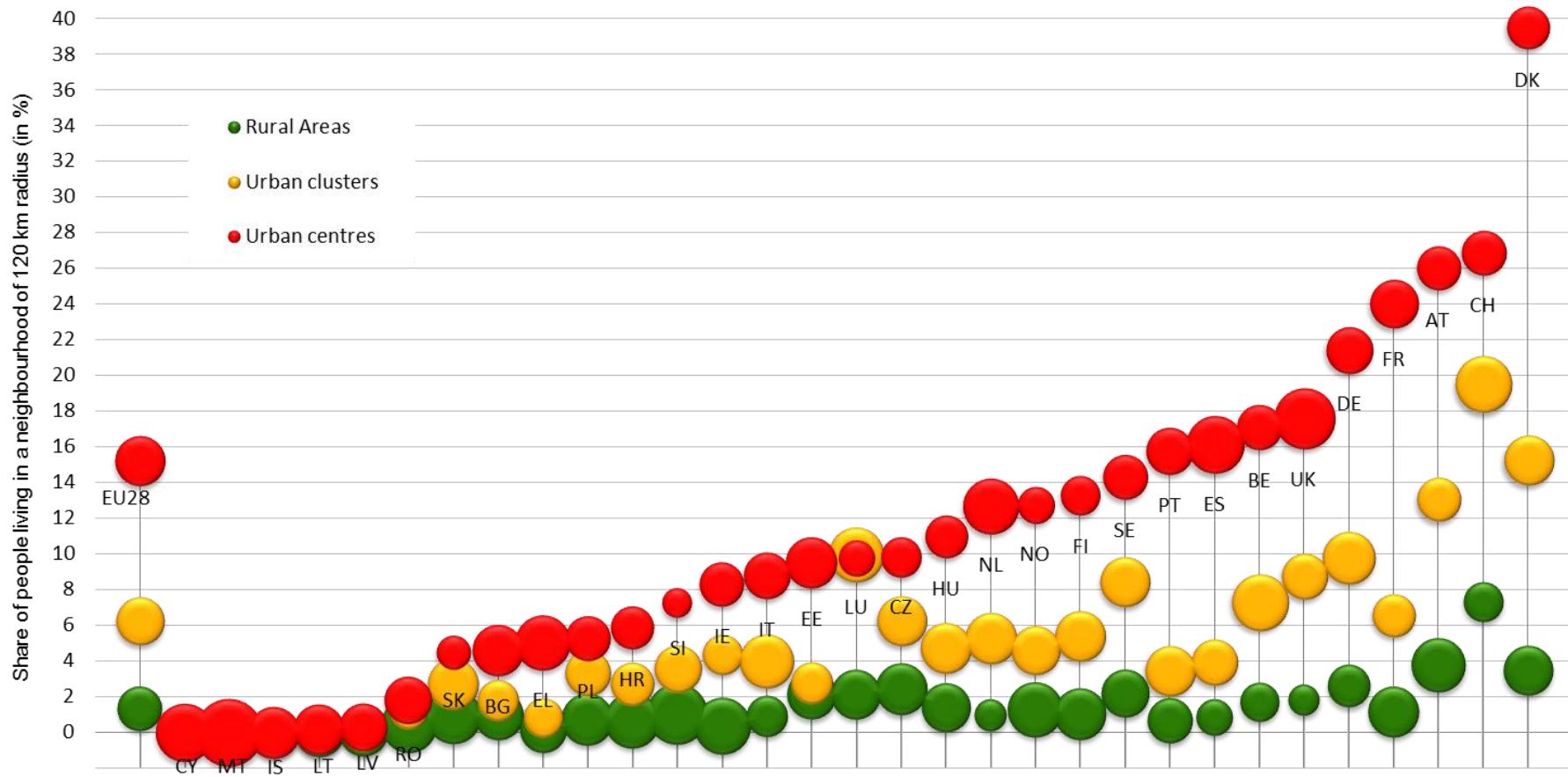
Population that can be reached within 1h30 (using optimal trips) by rail from the city, as share of population in a neighbourhood of 120 km radius.

Sources: UIC, railway operators, Eurostat, JRC, REGIO-GIS

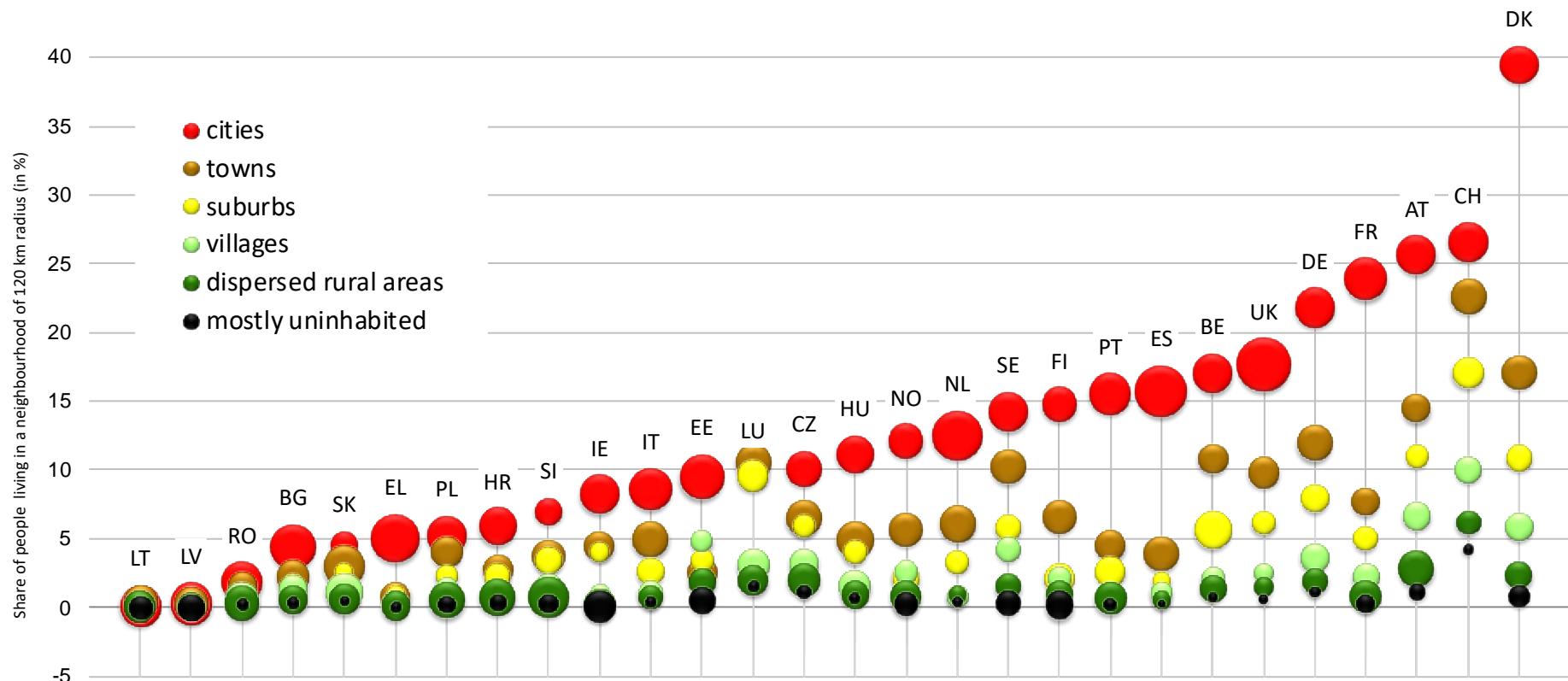
0 500 km

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## Population accessible within 1h30 of optimal travel time by rail



# Rail passenger transport performance by degree of urbanisation level 2



Note: Countries ranked by the value of cities; countries without railways are not shown

Bubble size is the share of national population living in the area



# **LOCAL ACCESS IN CITIES AND FUAS**



# Local access (applied to FUAs)

- *Local: car, public transport and bicycle*
  - **8km vs 30 minutes**
- *Local: walking*
  - **2km vs 30 minutes**
- *Analysis based on cells of 500m by 500m or city blocks*
- *Joint project EU, OECD and ITF*
- *To be published in May 2019*



Schools



Green  
Spaces

Shops

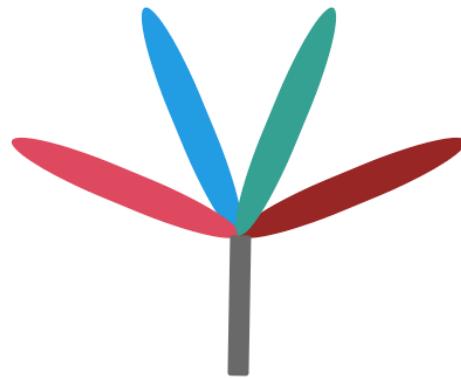


Population

Relative  
accessibility

Destination  
distribution

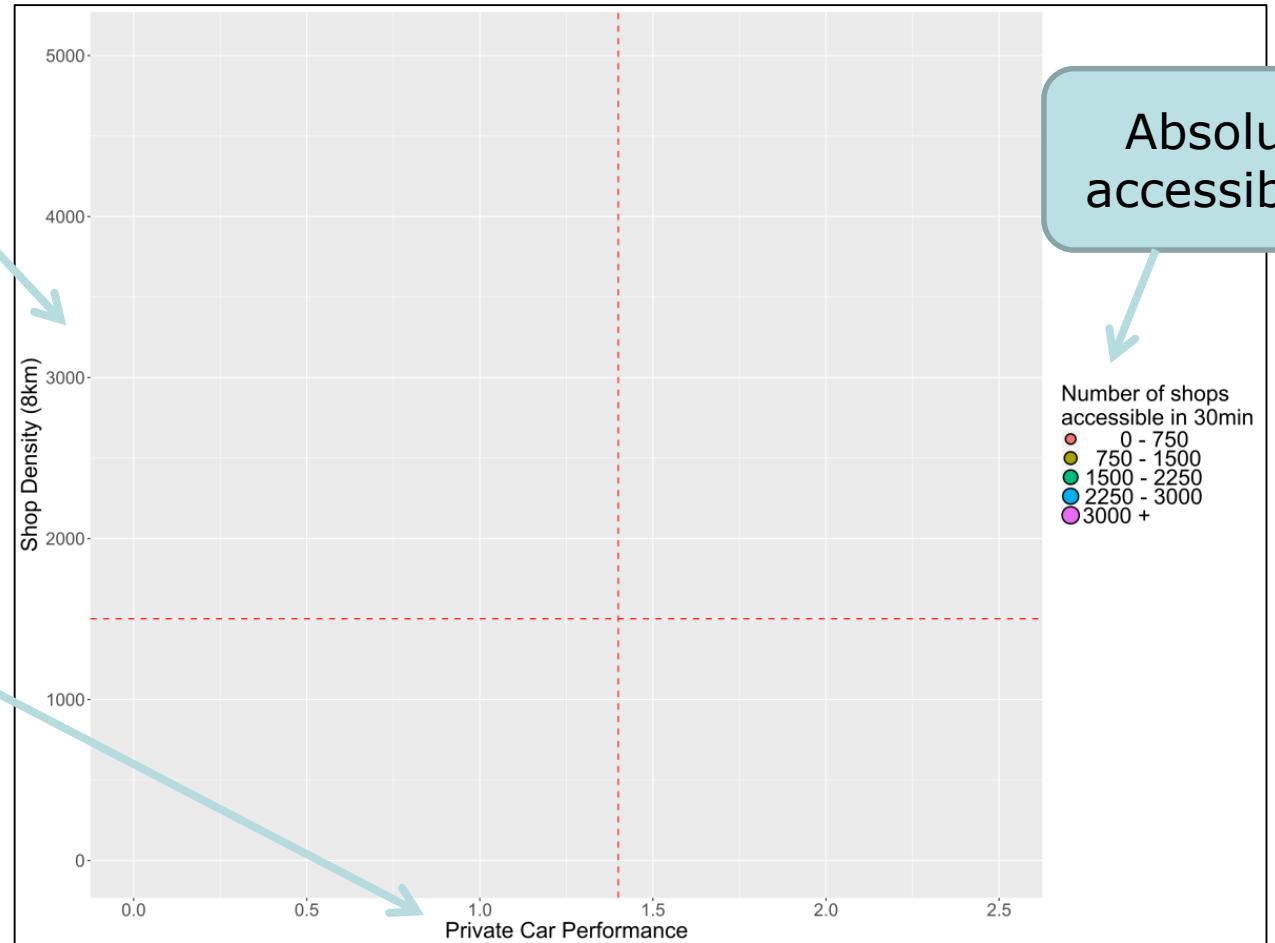
Transport  
performance



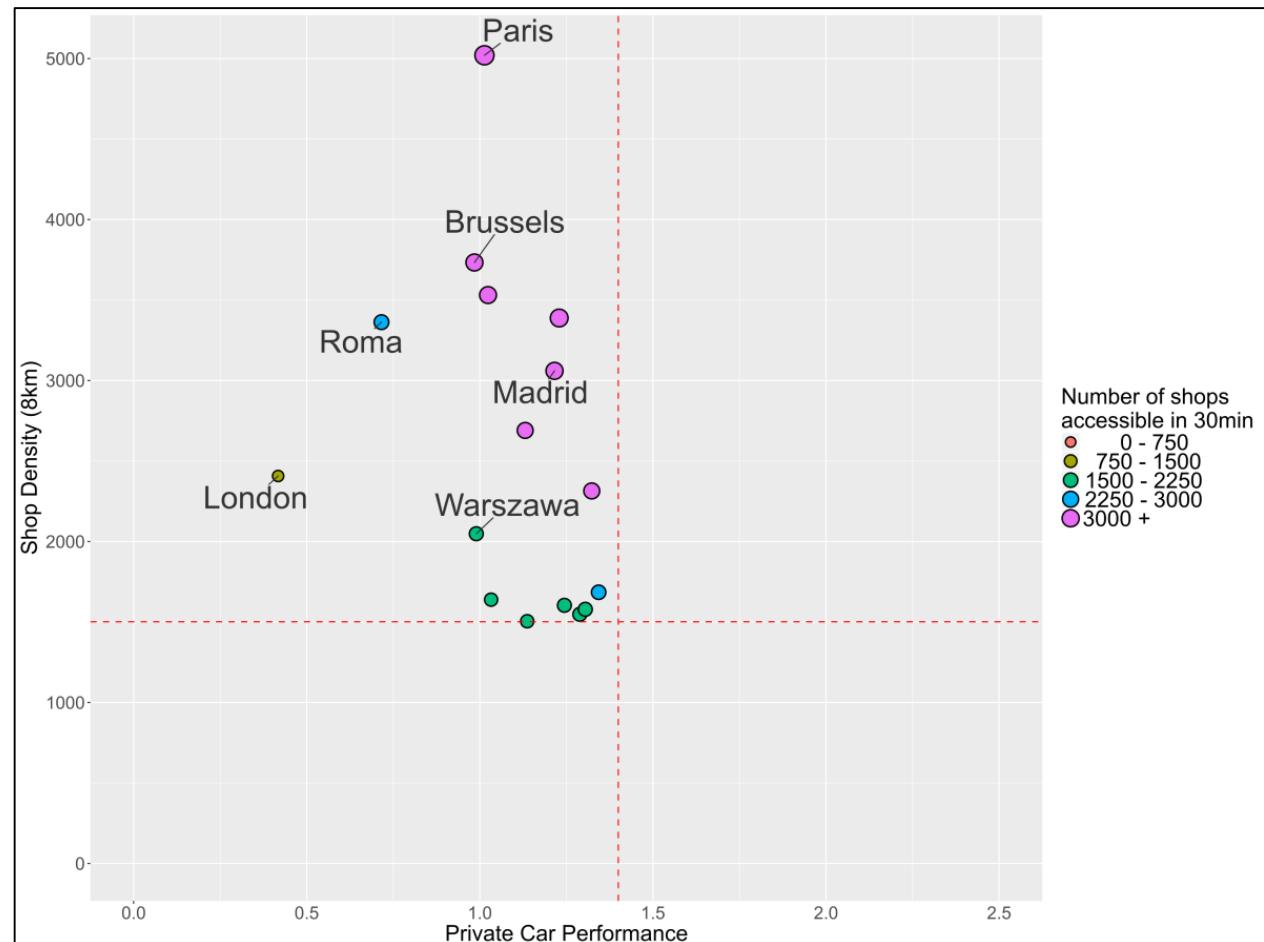
Destination distribution

Transport performance

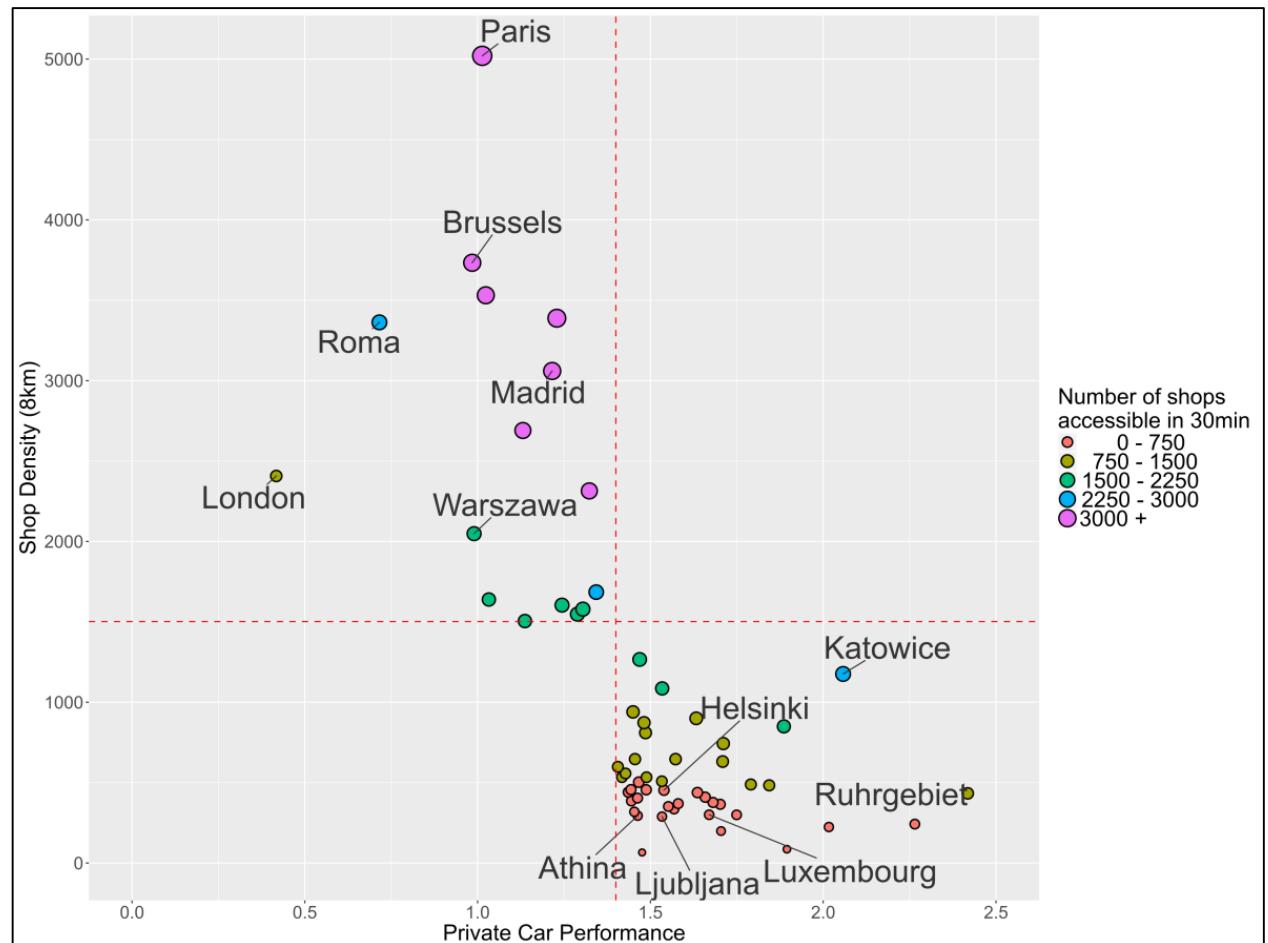
Absolute accessibility



1<sup>st</sup> quadrant:  
big dense  
cities

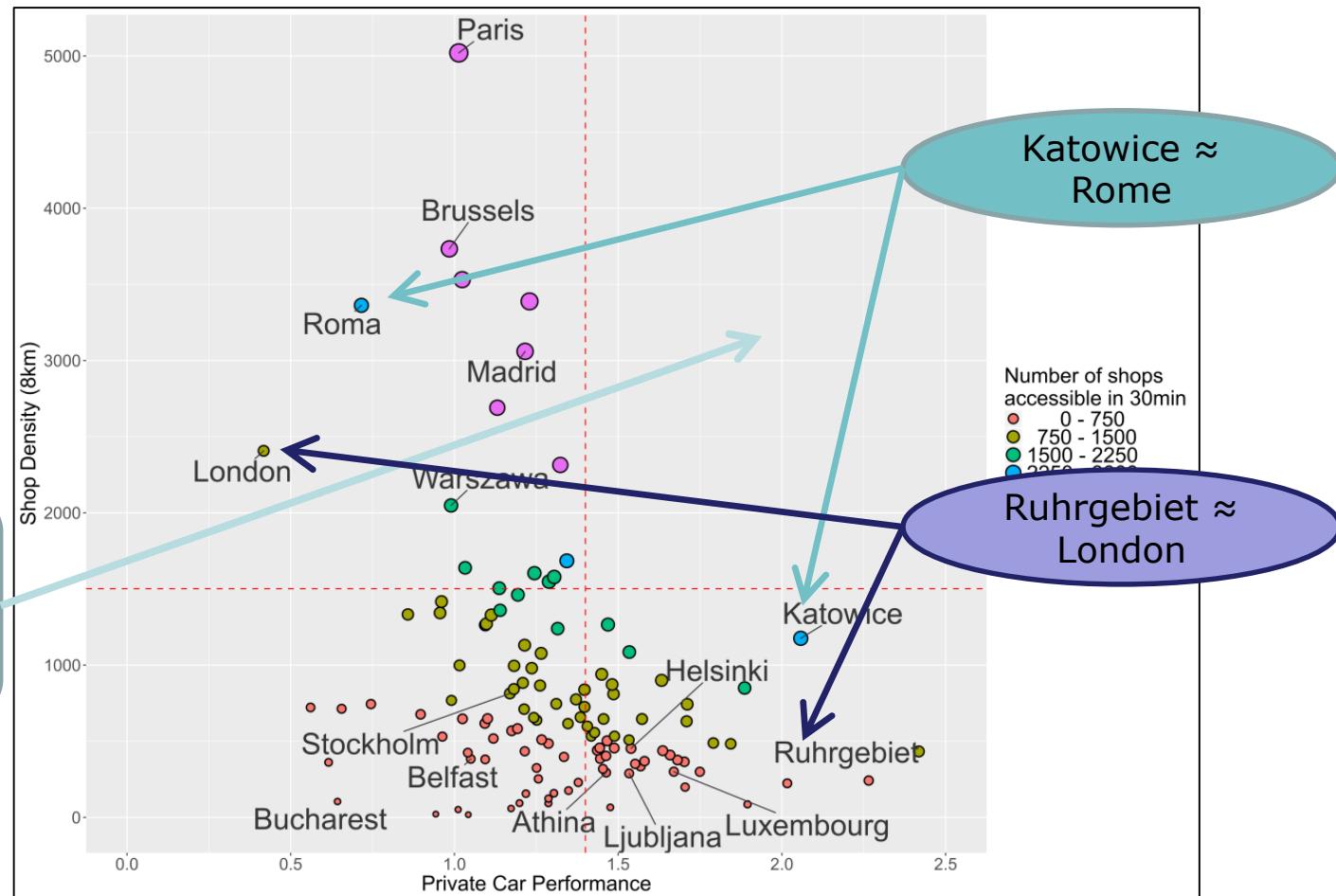


4<sup>th</sup> quadrant:  
smaller,  
“faster”  
cities

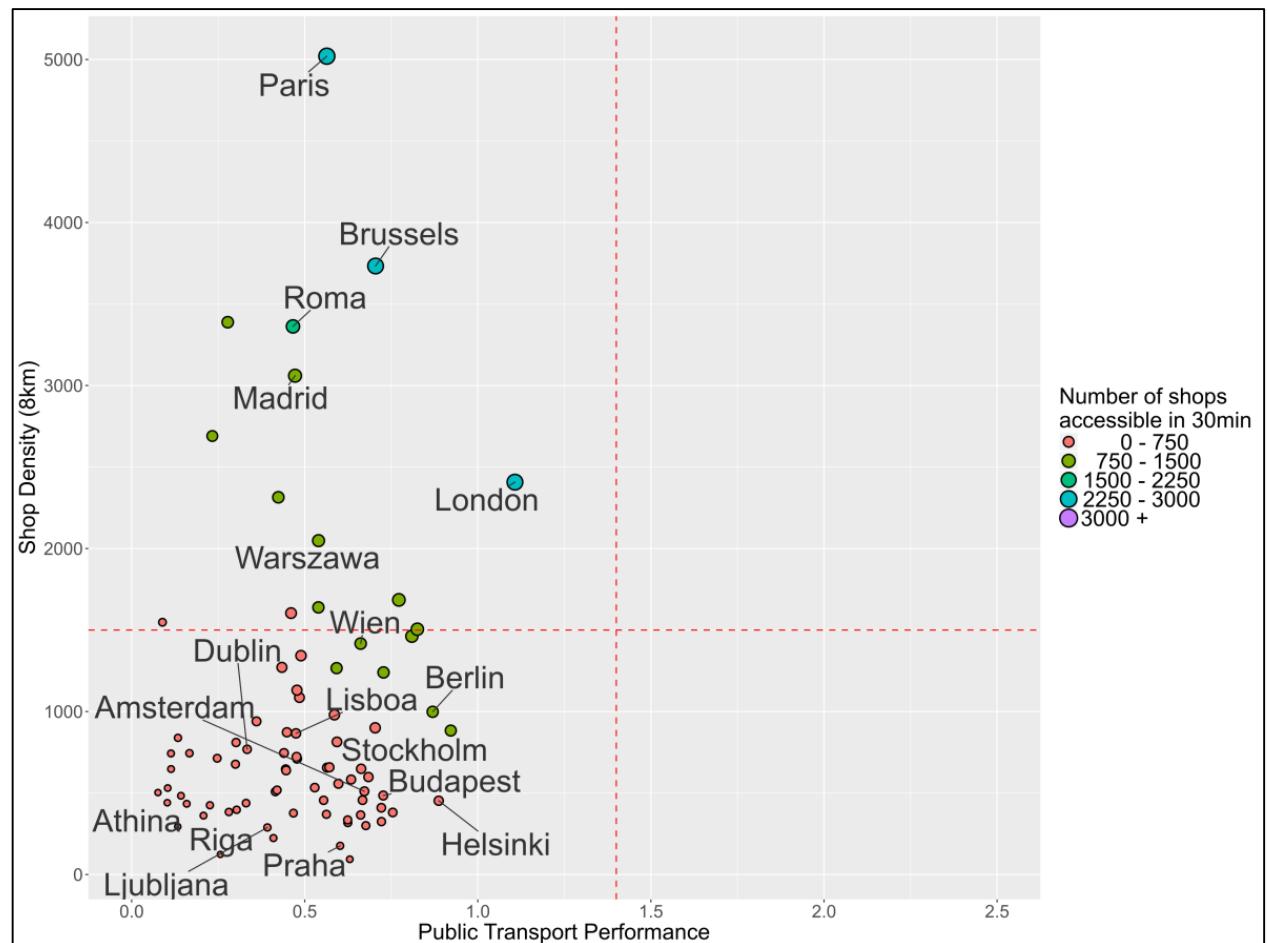


3<sup>rd</sup> quadrant:  
less dense,  
“slower”  
cities

2<sup>nd</sup> quadrant:  
no dense and  
fast cities!!



# Accessibility in urban cores by public transport



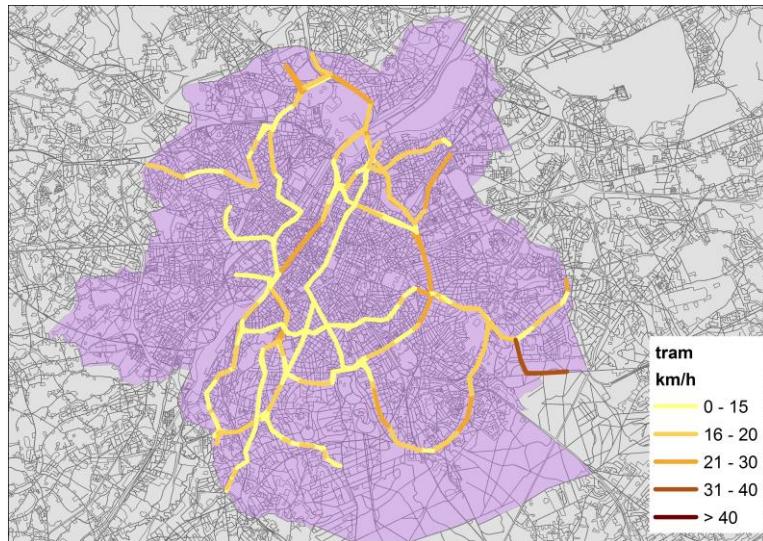


# Other key transport indicators

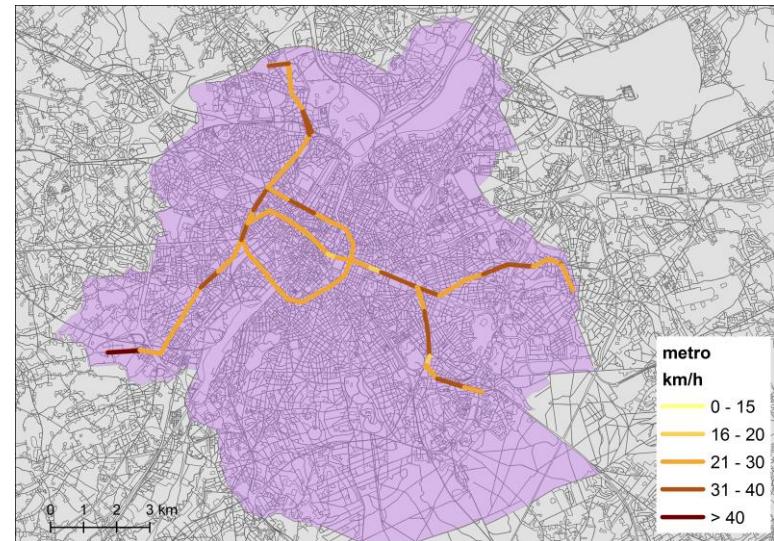
- *Road fatalities per capita*
- *Neighbourhood density (weighted density)*
- *Public transport*
  - **Stops per capita**
  - **Departures per capita**
  - **Vehicle km travelled per capita**
  - **Average speed of public transport**
- *Population*
  - **With and without easy access**
  - **with easy access to a high frequency stop**

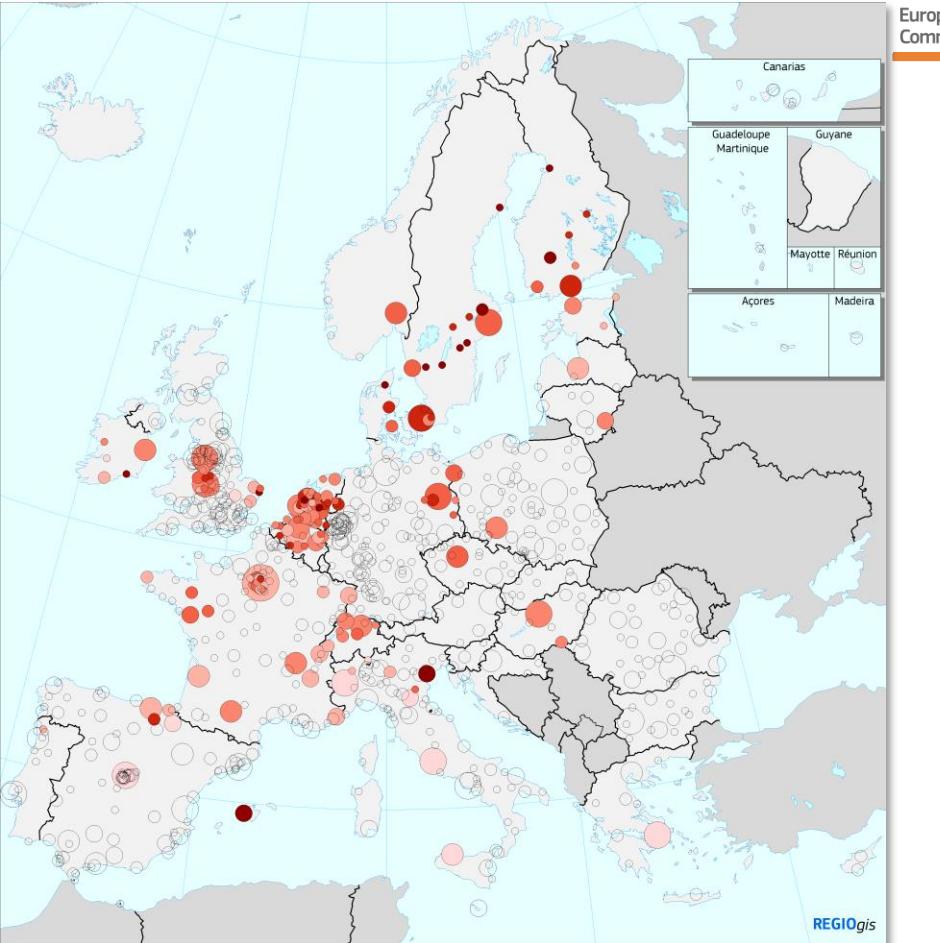
# Quantifying trip length and speed

- Timetable data combined with stop locations
- Connections between two stops represented by straight lines
- Average speed and frequency for each connection



Brussels (city): average Euclidian speed by segment of the tram and the metro network

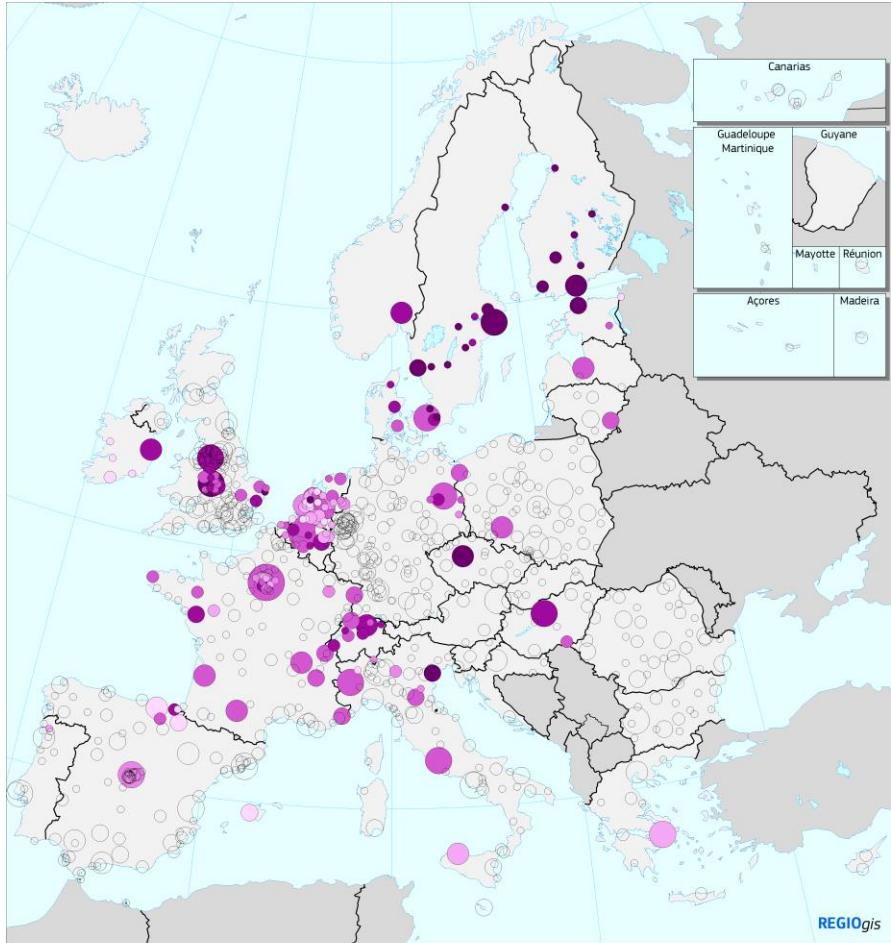




Speed of public transport services in cities, 2013-2014

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# Conclusion

- *Analysing and understanding transport has come a long way in the last twenty years*
- *Geospatial data is creating new opportunities to capture origins, destinations and trips*
- *This will further improve in the future*
- *Will be presented at the International Transport Forum in Leipzig next year*