

## Transport networks concentrated around economic hubs

### Inland transport regional infrastructure (EU27, NUTS2, 2009 data)

The evolution of the transport network is closely linked to the general development of the economy. A flourishing economy will result in increasing transport demand, while stagnation has the opposite effect. This is particularly true for goods transport. To a smaller extent, it also applies to passenger transport.

The EU has one of the densest transport networks in the world. This reflects a number of factors, including population density and transport demand. Transport demand is especially high in urban, industrial and other densely populated areas and there is a need of adapted infrastructure to meet this demand in these areas.

The highest motorway density is found in the regions of the Netherlands (78 km per 1000 km<sup>2</sup> on average in 2009), Luxembourg (59) and

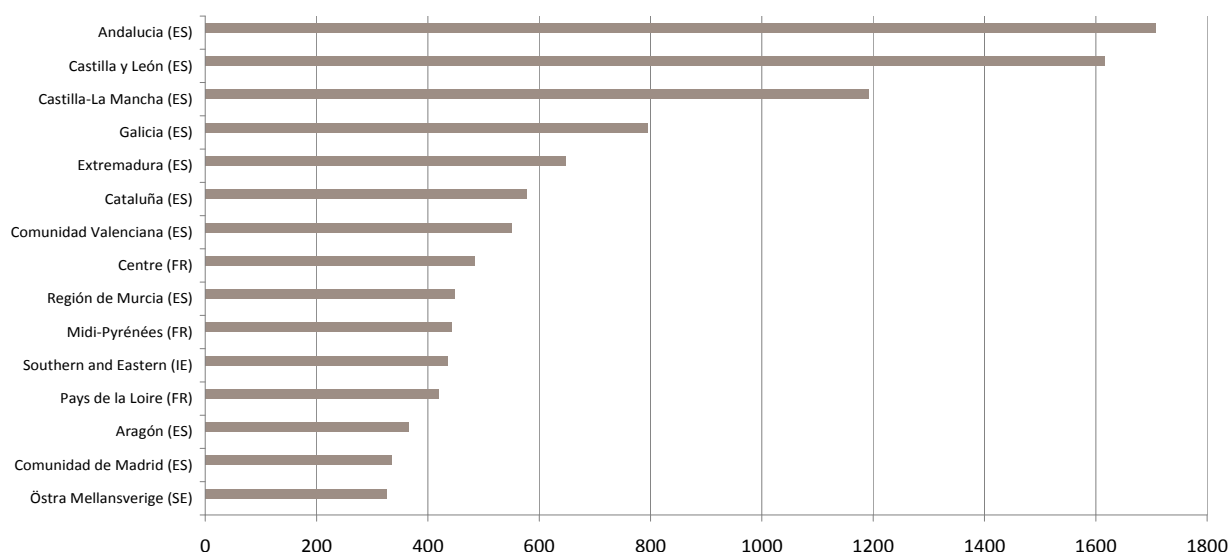
Belgium (58). The motorway network is especially concentrated in regions with urbanised areas.

Eight out of the nine regions showing the most significant motorway expansion between 1990 and 2009 are located in Spain (Figure 1). This reflects the strong development of the motorway network in this country over the last decades.

Railway network density is especially high in the regions of the Czech Republic (124 km per 1000 km<sup>2</sup> on average in 2009), Belgium (118), Luxembourg (106) and Germany (106). The highest rail density ratios are often observed in capital regions, such as Berlin, Prague, Bucharest and Madrid.

Regional rail density is especially driven by the presence of economic activities such as heavy industries or seaport infrastructures.

Figure 1: Regions with the most significant motorway expansion between 1990 and 2009 (in kilometres) \*



\* Non full EU-27 coverage, see methodological notes

Source: Eurostat (online data code : [tran\\_r\\_net](#))

## The densest motorway networks are located around key economic hubs

Comparing the length of the motorways to the area of the regions gives a good picture of the motorway infrastructure and concentration within the EU<sup>1</sup>.

In relative terms, the most significant motorway expansion between 1990 and 2009 took place in the Hungarian region of Eszak-Magyarország (+3171%), followed by the Southern and Eastern region of Ireland (+1678%) and Nyugat-Dunantul in Hungary (+811%). However, these impressive growth rates are explained by the very small

motorway networks in these regions in 1990 (less than 30 km).

When focusing on absolute changes over the same period, the picture looks different. Eight out of the nine regions that recorded the largest absolute change are located in Spain. The main increases were registered in Andalucía (+1708 km of motorways between 1990 and 2009), Castilla y León (+1616 km) and Castilla-La Mancha (+1193 km).

**Table 1: Regions with the highest motorway density (km/1000 km<sup>2</sup>) \***

| Rank | Country | NUTS                 | Length of motorways (km) | Land area (km <sup>2</sup> ) | Motorway density (km/1000 km <sup>2</sup> ) |
|------|---------|----------------------|--------------------------|------------------------------|---|
| 1    | DE      | Bremen               | 75                       | 404                          | 186   |
| 2    | UK      | Greater Manchester   | 177                      | 1 276                        | 139   |
| 3    | NL      | Utrecht              | 177                      | 1 386                        | 128   |
| 4    | NL      | Zuid-Holland         | 353                      | 2 818                        | 125   |
| 5    | DE      | Düsseldorf           | 649                      | 5 290                        | 123   |
| 6    | AT      | Wien                 | 43                       | 396                          | 109   |
| 7    | DE      | Hamburg              | 81                       | 755                          | 107   |
| 8    | NL      | Noord-Holland        | 283                      | 2 670                        | 106   |
| 9    | NL      | Limburg              | 219                      | 2 153                        | 102   |
| 10   | UK      | Merseyside           | 64                       | 644                          | 100   |
| 11   | NL      | Noord-Brabant        | 483                      | 4 919                        | 98  |
| 12   | ES      | Comunidad de Madrid  | 760                      | 8 028                        | 95  |
| 13   | UK      | West Midlands        | 81                       | 901                          | 90  |
| 14   | DE      | Berlin               | 77                       | 891                          | 86  |
| 15   | BE      | Prov. Vlaams-Brabant | 175                      | 2 100                        | 83  |
| 16   | NL      | Gelderland           | 393                      | 4 975                        | 79  |
| 17   | BE      | Prov. Antwerpen      | 220                      | 2 792                        | 79  |
| 18   | DE      | Köln                 | 558                      | 7 364                        | 76  |
| 19   | BE      | Prov. Hainaut        | 284                      | 3 773                        | 75  |
| 20   | UK      | South Yorkshire      | 115                      | 1 551                        | 74  |

\* Non full EU-27 coverage, see methodological notes

Source: Eurostat (online data codes: [tran\\_r\\_net](#), [demo\\_r\\_d3area](#))

Unsurprisingly, the highest motorway densities are found around European capitals and other big cities, in large industrial conurbations and around major seaports.

The motorway density in the Lisboa region was estimated at around 220 km in 2004. However, as data for more recent years are not available, this region is not included in Table 1.

Major industrialised areas with high motorway density include the north-western part of England (Greater Manchester: 139 km/1000 km<sup>2</sup> in 2009 and Merseyside: 100 km/1000 km<sup>2</sup>) and, in

Germany, the Ruhrgebiet (Düsseldorf: 123 km/1000 km<sup>2</sup>) and the Rhein-Main region (Köln: 76 km/1000 km<sup>2</sup>; Darmstadt: 64 km/1000 km<sup>2</sup>).

Most European capitals and large cities are surrounded by a ring of motorways in order to meet the high demand for road transport originating from these metropolitan areas. For example, dense motorway networks can be found around capitals: Wien (109 km/1000 km<sup>2</sup>), Amsterdam (Noord-Holland: 106 km/1000 km<sup>2</sup>), Madrid (95 km/1000 km<sup>2</sup>), Berlin (86 km/1000 km<sup>2</sup>), Copenhagen

<sup>1</sup> For data availability reasons (see methodological notes), all rankings presented in this publication are to be considered carefully when drawing conclusions at EU level.

(Hovedstaden: 61 km/1000 km<sup>2</sup>– 2008 data), Luxembourg (59 km/1000 km<sup>2</sup>) and Paris (Île-de-France: 50 km/1000 km<sup>2</sup>). Since the motorways are generally concentrated in a ring close to the cities, the reported density decreases when the area of the NUTS2 region concerned increases. As a result, the motorway density reported for the small NUTS2 region of Wien is higher than for the much larger NUTS2 region of Île-de-France, even though the motorway network of Paris is larger.

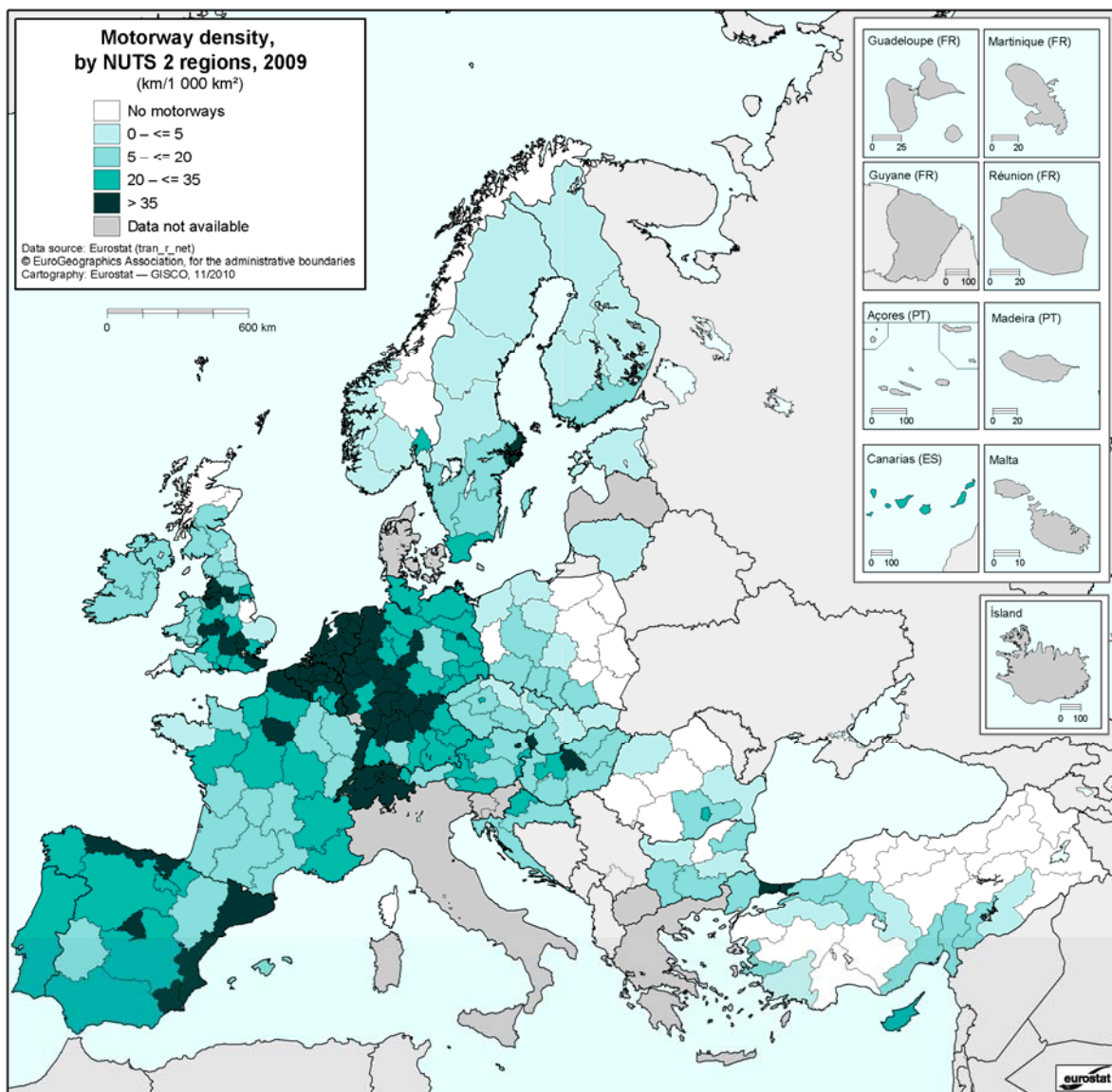
Other densely populated regions with high motorway density include the Randstad region in the western part of the Netherlands (Utrecht: 128 km/1000 km<sup>2</sup>, Zuid Holland: 125 km/1000 km<sup>2</sup> and Noord-Holland: 106 km/1000 km<sup>2</sup>) and the area around Birmingham in the United Kingdom (West Midlands: 90 km/1000 km<sup>2</sup>).

High motorway density is also found around the major seaports of northern Europe: the motorway densities of the NUTS2 regions of Bremen (186 km/1000 km<sup>2</sup>) with the port of Bremerhaven, of Zuid-Holland with the port of Rotterdam (125 km/1000 km<sup>2</sup>) and of Hamburg (107 km/1000 km<sup>2</sup>) are among the highest of all European regions.

Another reason for the high density of the motorway network in central European countries (such as Germany) is the proportionately high and growing volume of transit freight traffic.

The density of motorways on islands is generally low, as islands cannot be reached directly by road: instead, they rely on sea or air transport. However, the motorway density of the Canarias is still relatively high at 29 km/1000 km<sup>2</sup>.

**Map 1: Motorway density (km/1000 km<sup>2</sup>) by regions**



Source: Eurostat (online data code : [tran\\_r\\_net](#))

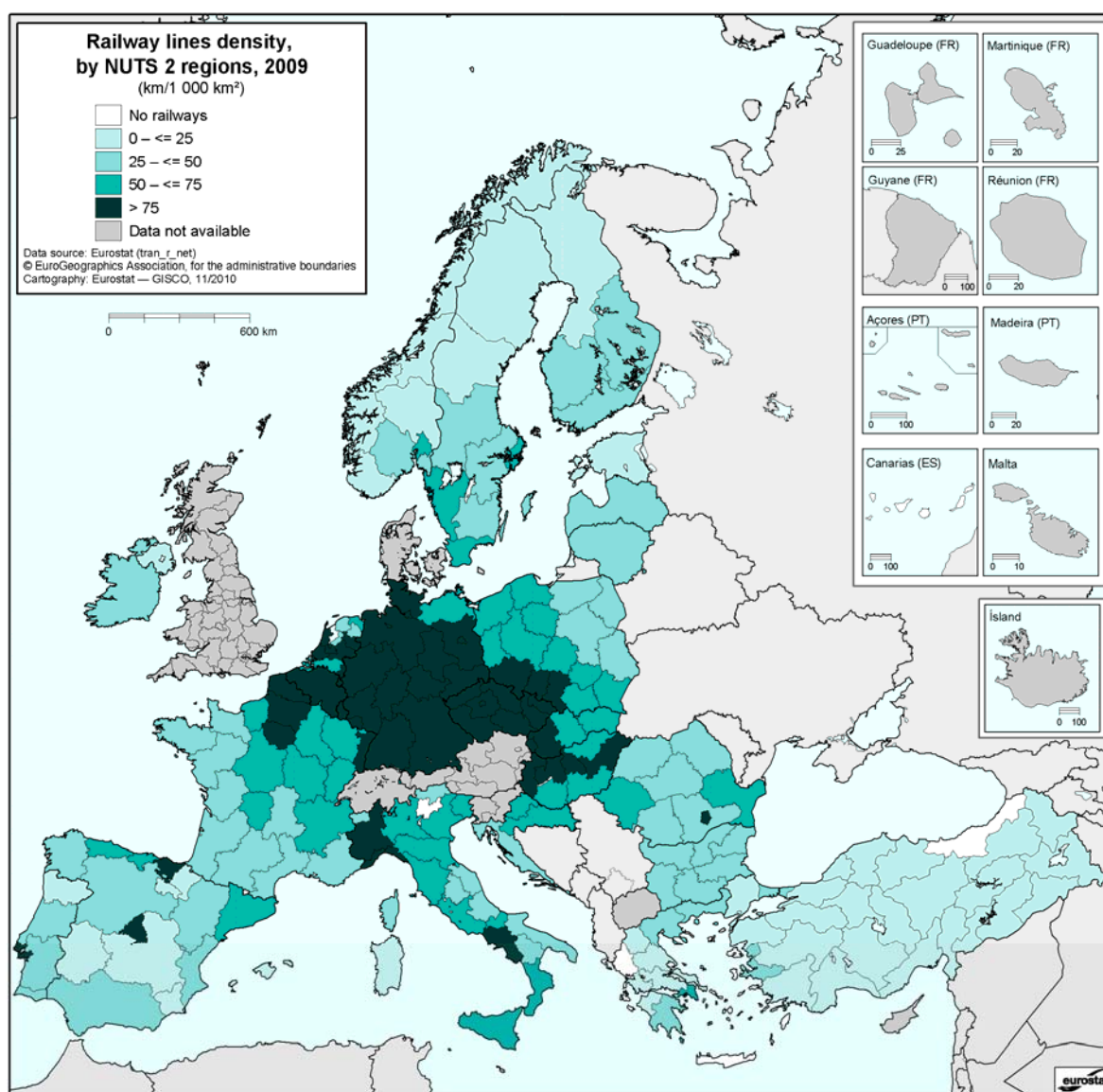
## High share of electrified railway lines in the Benelux countries

In general, the density of railway lines is high in western and central parts of Europe and lower in the peripheral parts. The highest network densities can be found in the regions of the Czech Republic, Belgium, Luxembourg and Germany (all above 100 km/1000 km<sup>2</sup> on average), followed by the regions of the Netherlands, Hungary, Austria, Slovakia, the United Kingdom and Poland (65 to 86 km/1000 km<sup>2</sup> on average).

Looking at individual regions, the densest railway networks are observed in capital regions: Berlin (703 km/1000 km<sup>2</sup>) and Praha (511 km/1000 km<sup>2</sup>).

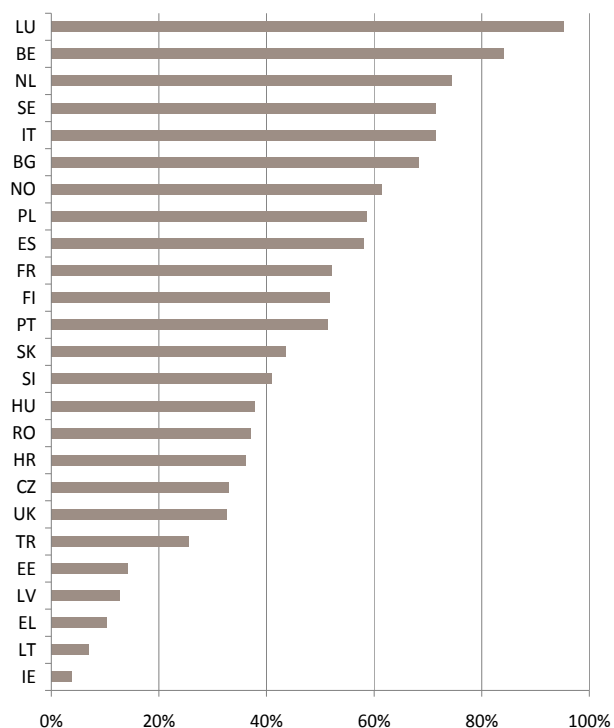
While these central European capitals have traditionally had a strong railway infrastructure, the strikingly high values are to a large extent due to the small size of these regions within the NUTS2 classification. Furthermore, the density of urban infrastructure tends to be much higher than the density of inter-urban roads and railway lines. Other capital regions with relatively dense rail networks are Bucharest (Bucuresti — Ilfov: 159 km/1000 km<sup>2</sup>), Paris (Île-de-France: 152 km/1000 km<sup>2</sup>) and Amsterdam (Noord-Holland: 134 km/1000 km<sup>2</sup>).

**Map 2: Railway lines density (km/1000 km<sup>2</sup>)**



Source: Eurostat (online data code : [tran\\_r\\_net](#))

**Figure 2: Share of electrified lines in total railway network length by country**



Source: Eurostat (online data code : [tran\\_r\\_net](#))

Thereafter come Bremen (428 km/1000 km<sup>2</sup>) and Hamburg (371 km/1000 km<sup>2</sup>), two more small NUTS2 regions where extensive freight lines to and from the seaports contribute to the high density. Like the capital regions mentioned above, Bremen and Hamburg are much smaller than regions like Zuid-Holland and Antwerpen. These differences make it hard to draw direct comparisons with the infrastructure at other North Sea ports.

Freight lines also play a leading role in several regions where coal and steel industries are predominant, like Saarland in western Germany (135 km/1000 km<sup>2</sup>) and Śląskie in south-west Poland (175 km/1000 km<sup>2</sup>).

Focusing on railway infrastructure at country level, there are significant differences among countries with respect to the share of the network that is electrified. The Benelux countries registered the highest shares (Luxembourg: 95%, Belgium: 84% and the Netherlands: 74%) while Ireland, Greece and the Baltic States were the only countries where electrified lines represented less than 20% of the network.

## Very high density of inland waterways in the Netherlands

**Table 2: Regions with the highest inland waterways (navigable canals, rivers and lakes) density (km/1000 km<sup>2</sup>) \***

| Rank | Country | NUTS                   | Length of inland waterways (km) | Total area (km <sup>2</sup> ) | Inland waterways density (km/1000 km <sup>2</sup> ) |
|------|---------|------------------------|---------------------------------|-------------------------------|---|
| 1    | NL      | Zuid-Holland           | 927                             | 3 403                         | 272   |
| 2    | NL      | Flevoland              | 600                             | 2 412                         | 249   |
| 3    | NL      | Utrecht                | 351                             | 1 449                         | 242   |
| 4    | NL      | Noord-Holland          | 850                             | 4 091                         | 208   |
| 5    | DE      | Berlin                 | 183                             | 891                           | 205   |
| 6    | NL      | Zeeland                | 549                             | 2 933                         | 187   |
| 7    | NL      | Groningen              | 512                             | 2 960                         | 173   |
| 8    | NL      | Friesland              | 907                             | 5 748                         | 158   |
| 9    | DE      | Bremen                 | 61                              | 404                           | 151   |
| 10   | NL      | Limburg                | 248                             | 2 209                         | 112   |
| 11   | NL      | Noord-Brabant          | 558                             | 5 081                         | 110   |
| 12   | NL      | Overijssel             | 351                             | 3 420                         | 103   |
| 13   | NL      | Gelderland             | 496                             | 5 136                         | 97  |
| 14   | DE      | Hamburg                | 53                              | 755                           | 70  |
| 15   | FI      | Itä-Suomi              | 5 528                           | 85 172                        | 65  |
| 16   | NL      | Drenthe                | 169                             | 2 680                         | 63  |
| 17   | FR      | Nord - Pas-de-Calais   | 674                             | 12 414                        | 54  |
| 18   | FR      | Île de France          | 634                             | 12 012                        | 53  |
| 19   | FR      | Alsace                 | 338                             | 8 280                         | 41  |
| 20   | DE      | Mecklenburg-Vorpommern | 907                             | 23 182                        | 39  |

\* Non full EU-27 coverage, see methodological notes

Source: Eurostat (online data codes: [tran\\_r\\_net](#), [demo\\_r\\_d3area](#))

Inland waterway transport concerns mainly goods transport. This network is unequally spread over the EU, with some regions completely lacking inland waterways and some others having a very long waterway system, such as the regions of the Netherlands.

A very high density of more than 200 km/1000 km<sup>2</sup> is observed in four regions of the Netherlands, Zuid-Holland (272), Flevoland (249), Utrecht (242) and Noord-Holland (208). The smallest regional density in the Netherlands was registered in the Drenthe region (63 km/1000 km<sup>2</sup>), which still ranked 16<sup>th</sup> amongst all regions for which data are available.

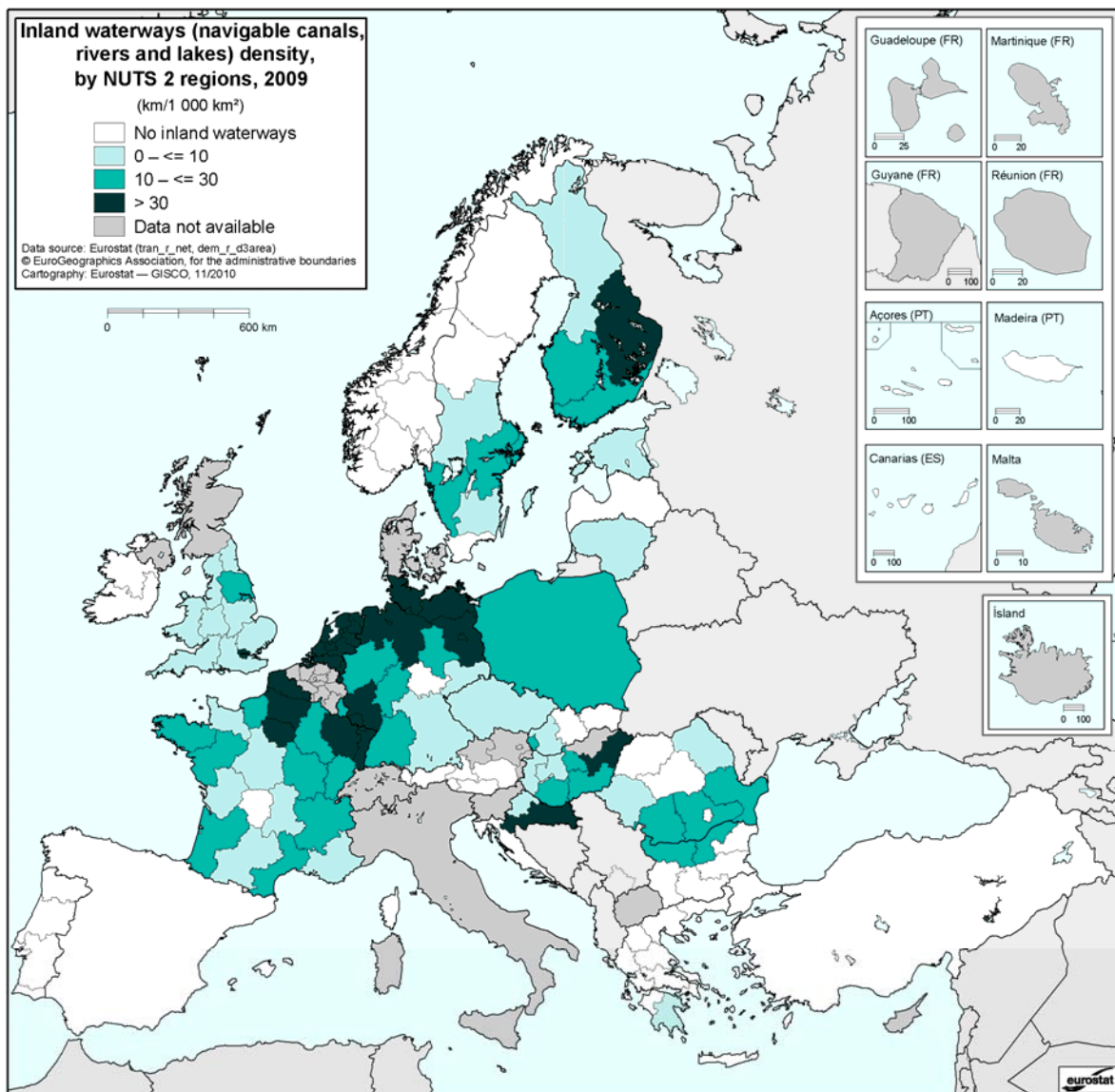
A part of this dense inland waterway network plays

a strategic role for freight transport between the ports of Rotterdam (located in the Zuid-Holland region) and Amsterdam (Noord-Holland) and Germany and Belgium.

Only two of the top-13 regions with the highest density did not belong to the Netherlands, but to Germany: the regions of Berlin (205 km/1000 km<sup>2</sup>) and Bremen (151). The regions of Hamburg and Mecklenburg-Vorpommern also have a dense network, with 70 and 39 km/1000 km<sup>2</sup> respectively.

Other regions with a dense inland waterway network are found in Finland (Itä-Suomi: 65 km/1000 km<sup>2</sup>) and in France (Nord-Pas-de-Calais: 54, Île de France: 53, Alsace: 41).

**Map 3: Inland waterways (navigable canals, rivers and lakes) density (km/1000 km<sup>2</sup>)**



For methodological reasons, total area should be used for inland waterways

Source: Eurostat (online data codes: [tran\\_r\\_net](#), [demo\\_r\\_d3area](#))

## METHODOLOGICAL NOTES

### Data sources

Eurostat collects regional statistics on the infrastructure of road, railways and inland waterways, as well as vehicle stocks and road accidents. The data are provided by the Member States, the Candidate Countries and some EFTA countries on a voluntary basis using the REGWEB online application. The data are collected at NUTS0, NUTS1 and NUTS2 levels for these transport indicators.

### Definitions

(Source: Glossary for transport statistics, 4th edition)

#### Motorway

Road, specially designed and built for motor traffic, which does not serve properties bordering on it, and which:

- a) is provided, except at special points or temporarily, with separate carriageways for traffic in two directions, separated from each other, either by a dividing strip not intended for traffic, or exceptionally by other means
- b) has no crossings at the same level with any road, railway or tramway track, or footpath
- c) is especially sign-posted as a motorway and is reserved for specific categories of road motor vehicles. Entry and exit lanes of motorways are included irrespective of the location of the sign-posts. Urban motorways are also included.

#### Railway network

All railways in a given area.

This does not include stretches of road or water even if rolling stock is conveyed over such routes, e.g. by wagon carrying trailers or ferries. Lines solely used for tourism are excluded as are railways constructed solely to serve mines, forests or other industrial or agricultural undertakings and which are not open to public traffic.

#### Navigable inland waterway

A stretch of water, not part of the sea, which by natural or man-made features is suitable for navigation, primarily by inland waterway vessels. This term covers navigable rivers, lakes, canals and estuaries. The length of rivers and canals is measured in mid-channel. The length of lakes and lagoons is measured along the shortest navigable route between the most distant points to and from which transport operations are performed. A waterway forming a common frontier between two countries is reported by both.

### Density calculation

The reference area for the calculation of motorway and railway lines density is the land area of the regions (e.g. excluding lakes and rivers): this is the area where such infrastructure can be built.

The reference area for the calculation of inland waterways density is the total area of the regions (e.g. area including lakes and rivers).

### Rankings in Figures 1 and 2 and Tables 1 and 2

As the data collection is performed on a voluntary basis,

data are not available for some countries. Consequently, the rankings presented are based on the available data and they should be analysed with caution.

#### Country coverage

Figure 1: 1990 data on motorways not available at NUTS2 level for BG, CZ, LV, MT, FI and UK.

Figure 1 and Table 1: 2009 data on motorways not available at NUTS2 level for DK, IT, LV and PT.

Figure 2: 2009 data on the share of electrified railway lines in total railway network not available for DK, DE and AT.

Table 2: 2009 data on inland waterways not available at NUTS2 level for AT.

### Country Specific Notes

BG: The length of the railway network excludes railway lines at stations.

EE: Data on motorways refer to 1<sup>st</sup> class roads.

CH: Data on motorways cover 4- to 7-lane highways.

### Regional breakdown

The Nomenclature of Territorial Units for Statistics (NUTS) was established by Eurostat more than 30 years ago in order to provide a single uniform breakdown of territorial units for the production of regional statistics for the European Union. From 1 May 2004, the regions in the 10 new Member States were added and from 1 January 2007 the regions of Bulgaria and Romania. Certain smaller Member States are not sub-divided in NUTS regions. This is the case for Estonia (EE), Cyprus (CY), Latvia (LV), Lithuania (LT), Luxembourg (LU) and Malta (MT).

### Country codes

#### *Aggregates*

EU: the European Union, including the 27 Member States (EU-27)

#### *EU-27 countries*

Belgium (BE), Bulgaria (BG), the Czech Republic (CZ), Denmark (DK), Germany (DE), Estonia (EE), Greece (EL), Spain (ES), France (FR), Ireland (IE), Italy (IT), Cyprus (CY), Latvia (LV), Lithuania (LT), Luxembourg (LU), Hungary (HU), Malta (MT), the Netherlands (NL), Austria (AT), Poland (PL), Portugal (PT), Romania (RO), Slovenia (SI), Slovakia (SK), Finland (FI), Sweden (SE) and the United Kingdom (UK).

#### *EFTA countries*

Iceland (IS), Liechtenstein (LI), Norway (NO), Switzerland (CH).

#### *Candidate Countries*

Montenegro (ME), Croatia (HR), Iceland (IS), the former Yugoslav Republic of Macedonia (MK), Turkey (TR).

This publication was prepared with the assistance of Mathieu Erzar.

## Further information

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Eurostat Website: <http://ec.europa.eu/eurostat>

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<http://epp.eurostat.ec.europa.eu/portal/page/portal/transport/data/database>

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