

TPM

Territorial Performance Monitoring

Annexes

Quantitative Analysis
North Rhine-Westphalia (NRW)

Targeted Analysis 2013/02/13

Interim Report | Version 31/August/2011



This report presents the interim results of a Targeted Analysis conducted within the framework of the ESPON 2013 Programme, partly financed by the European Regional Development Fund.

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1. Methodology

In this section on quantitative benchmarking, the regions are examined under the key indicators listed above in a European, national and neighbourhood perspective.

Benchmarking an entire region as a single unit in comparison to other groupings of European countries requires some consolidation of statistical units, instead of comparing each region at its lowest possible statistical level. Since the selected regions are predominantly composed of several NUTS 3 regions, NUTS 2 or NUTS 1 regions were chosen for this benchmarking in order to capture an overall picture of their performance. Since the regions highly differ in size, population and most relevantly in their statistical reference levels, a short introduction to each region and its statistical characteristics is given.

As first approach to quantitative benchmarking, the ESPON HyperAtlas is used as analytical tool in order to simply calculate the benchmarking values of each indicator in European, national and neighbourhood deviation. This tool also allows for a quick mapping of the collected data and thus provides a comprehensive overview over the data. However, due to characteristics of the HyperAtlas as benchmarking toolkit, which only allows indicators consisting of two datasets, a nominator and a denominator, the prototype of a second, very simple, benchmarking tool has been developed for this project: the ESPON TPM regional benchmarking tool. In addition to the same type of benchmarking as the HyperAtlas, this tool allows to calculate benchmarking values for indicators which are only available already calculated and cannot be split into two single datasets due to their nature or data unavailability can be used in this spreadsheet-based tool since they cannot be uploaded to the HyperAtlas. These two methods differ in the number of reference scales and in their resulting benchmarking values since they use different approaches. However, comparability is ensured, especially through a rough classification and illustration in a graphical way, in this case through traffic lights.

The quantitative benchmarking values were derived from setting each region's performance for one indicator in relation to the overall European / national / regional performance. Thus, the values are measured against the benchmarking values and classified into 3 categories: good, average and bad. As mentioned before, the two benchmarking tools used in this study differ in their approach; benchmarking values generated by the *HyperAtlas* vary around a reference value of 100 and were classified as followed: *benchmarking value* = > 110 = *good*, 90-110= *average*, < 90 *bad*. This approach has the advantage of reflecting the customary approach in EU comparisons. However, it has the disadvantage giving quite different results depending on the overall order of magnitude of the indicator.¹ The second tool, on the other hand, uses another approach:

¹ Take the following example concerning unemployment: region A has an unemployment rate of 4,5%, and region B an unemployment rate of 7,5% compared to a reference value of 6%. The respective

the regional deviation to the reference value is compared to the standard deviation across all of Europe at the lowest available scale. Values thus vary around 0, with e.g. -0,5 indicating a negative deviation (less than the reference value) of half of the standard deviation and 2 indicating a positive deviation of twice the standard deviation. This makes comparisons between benchmarking results of different indicators more robust. For the classification of benchmarking results, we used the following general thresholds: < -0.1 *bad*, < 1 *good*. According to these categories, the three traffic lights have been chosen to represent the performance in a graphical way. However, one has to be careful when interpreting the calculated values since depending on the indicator (and depending on the political interpretation of the indicator), the direction of what is considered as “good” and “bad” might change. This is why for each indicator a short description and the proposed direction of its interpretation have been provided in the introductory part of this report. Additionally, arrows of the same three colours indicate the change in time for some indicators. The direction of the arrows might vary for each deviation, since it’s a measure of relative performance compared to the evolution of the same indicator at the reference level.

As using the two mentioned methods does not provide a more detailed perspective, mapping the indicators on a regional level allows for further differentiation within the regions, according to the underlying data preciseness and shall thus be suggested as another way of monitoring.

2. Introduction to the region for quantitative benchmarking

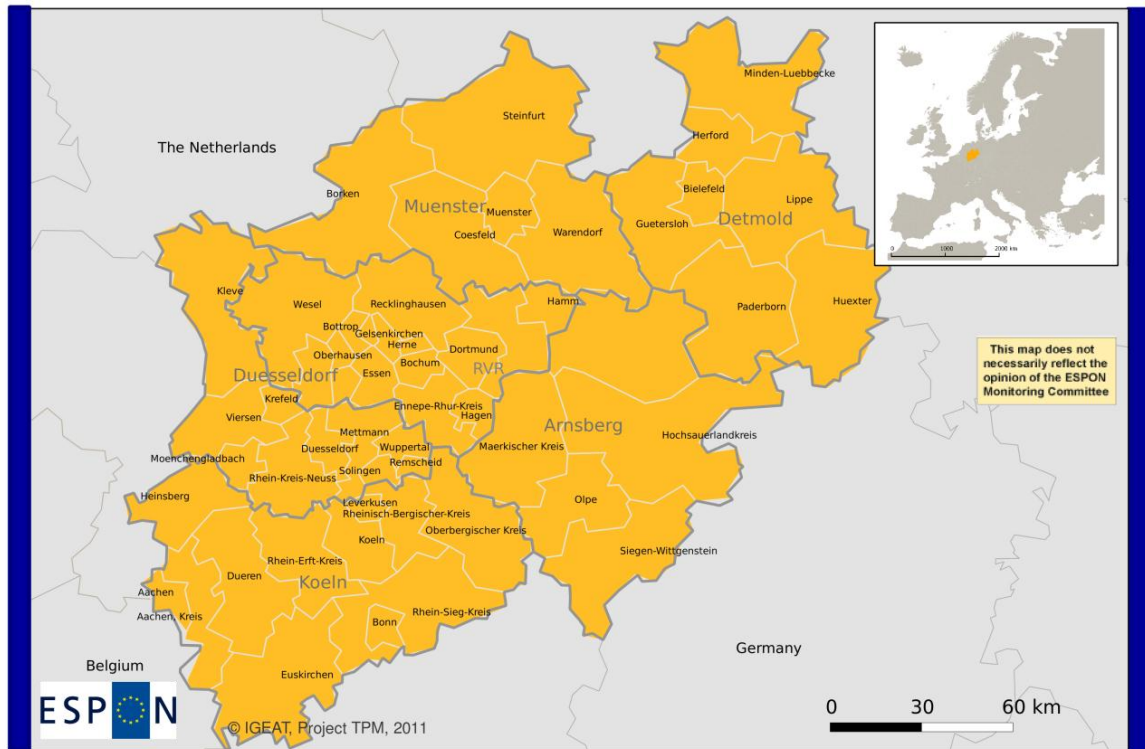
North Rhine-Westphalia with its state capital Düsseldorf is with 17,933,064 inhabitants on an area of approximately 34,000 km², thus 526 inhabitants per km², the most densely populated federal state in Germany. The state's area covers a maximum distance of 291 km from north to south, and 266 km from east to west and borders on the German states Lower Saxony, Hesse and Rhineland Palatinate as well as the countries Belgium and the Netherlands.

Overall, the regional levels NUTS 2 and 3 are relevant for benchmarking this region. North Rhine-Westphalia consists of 5 NUTS 2 regions and 50 NUTS3 regions. However, in terms of spatial planning NRW is divided into six spatial entities since 2009. These regional planning authorities are the districts of Arnsberg, Detmold, Düsseldorf, Köln and Münster as well as the Ruhr regional association (RVR), as it can be seen in map X.

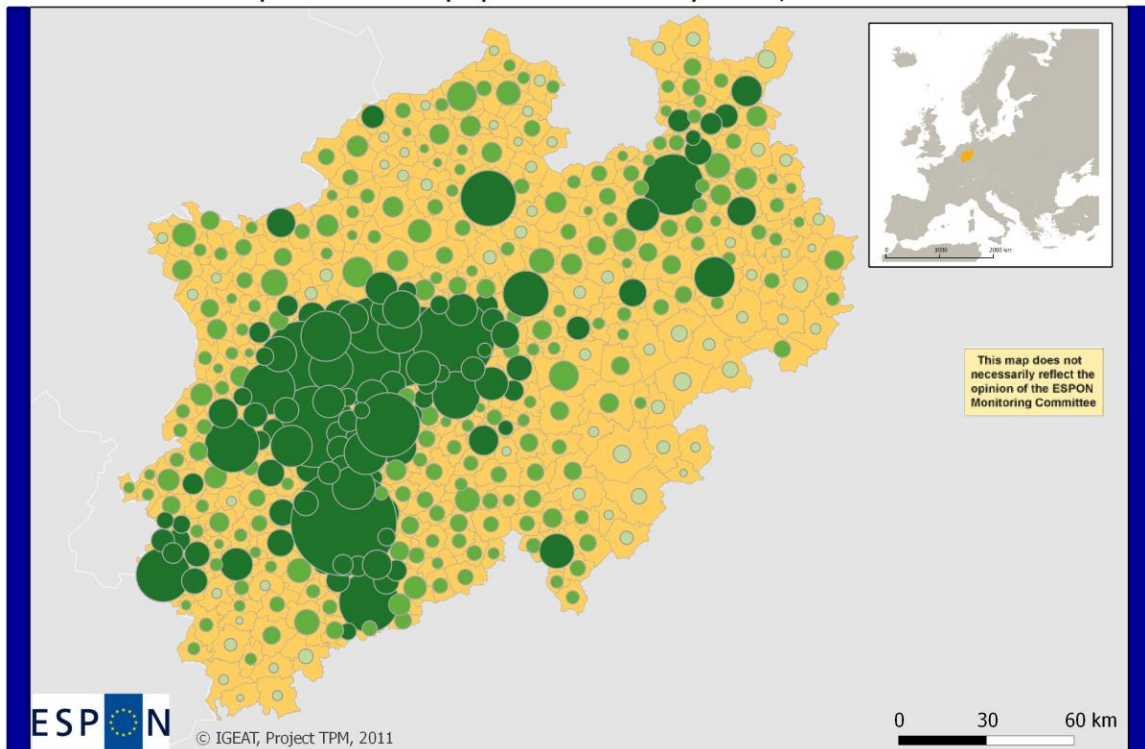
However, the regional benchmarking by the listed key indicators refers to the entire NUTS 1 region NRW, which has to be bore in mind when comparing all five regions.

benchmarking values would thus be $4,5/6 \cdot 100 = 75$ and 125. If you represent the exact same fact by its complement, i.e. the employment rate, you would get the following results: (A) $95,5/94 \cdot 100 = 102$, (B) $92,5/94 \cdot 100 = 98$. Both regions would thus seem much closer to each other in the second case, although the indicator shows the same reality.

Local map NRW



Population and population density NRW, 2006



3. Synthesis of quantitative benchmarking

3.1 Globalisation

In terms of European benchmarking of the challenge of globalisation, NRW accomplishes an overall good performance with minor fields that seek improvement. Simultaneously, the national and neighbourhood perspective conclude in a picture that requires much more differentiation and change.

High accessibility, high relative number of patents filed, high tourism occupancy rate and a low number of early school leavers together with a low unemployment rate represent the indicators that score well in the European context. In the contrary, high average salaries per economic sector, low shares of employment in the sectors of information /communication and professional/scientific/technical activities as well as the number of tourists coming from outside of NRW, migration into the region and the share of population with tertiary education do badly at the same time.

However, when looking at the entire country of Germany or even at neighbourhood scale, the picture becomes converse: while most of the well performing fields turn into average or low performing domains at regional level, the ones performing worse at European scale are categorized as well-performing at regional level. Except for the manufacturing sector, most aspects of accessibility and a bad performance in the share of population with tertiary education, the benchmarking picture differs highly, depending on which scale is examined.

3.2 Demography

The picture resulting from benchmarking indicators of demography can in general be described as average performance: young dependency ratio and population growth are categorized as average at all scales while the other demographic representatives vary in the European perspective, but even out at average performance at the regional scales. The population tends to a higher share of elderly people, a relatively old median age but also high life expectancy at European deviation. Only the median age is relatively young in comparison to other German regions. Even in comparison to other regions classified in the type of "Euro Standard" of the ESPON demography typology NRW's demographic structure shows similar characteristics.

3.3 Climate change

Taking together the benchmarking values and the spatial patterns shown in the maps NRW's performance in terms of climate change lies mostly below European averages. High percentage of sealed soil, low share of

NATURA 2000 areas, high concentration of particulate matter at surface level as well as comparably many days exceeding the standard ozone concentration are representatives of NRW's bad score in tackling climate change. Only the indicator monitoring the change in mean temperature in July brightens the benchmarking picture with a good performance on all deviations. The relatively high increase in maximum temperature in July earns NRW a bad position in the Europe-wide perspective. All other temperature indicators developed in contrary to the sighted direction mostly on all comparative levels. Only the increase in NRW's maximum temperature in July results in better benchmarking values at national and typology level. NRW's potential energy consumption for heating derived from the change in heating degree days over time also shows the region's average position among the other European regions.

In sum, NRW does in general not well in climate change aspects but even compared to other regions in the same type of the climate change typology this benchmarking sheds light on the necessity of improvement in coping with control and impacts of climate change.

3.4 Energy

Monitoring energy indicators for NRW reveals highly differing results between the indicators, but less between the different examined scales: NRW's low potential for solar energy is visible, but at the same time also the region's quite good position in potential sites for wind energy as renewable energy generation. At least at European perspective, the NUTS 1 region of NRW can compete with other regions for which relatively high potential for wind energy has been calculated. Also good performances can be found in terms of fuel costs for freight traffic as percentage of GDP since NRW has a comparatively low share here. Nonetheless, when looking at the indicator monitoring the employment in energy intensive industries, NRW falls below average performance because of its relatively high share of employment in this sector.

All in all, the calculated benchmarking values for the selected indicators shed light on the necessity for improvement in order to stay competitive and stable in terms of energy aspects also in the future.

4. Quantitative regional benchmarking

4.1 Globalisation

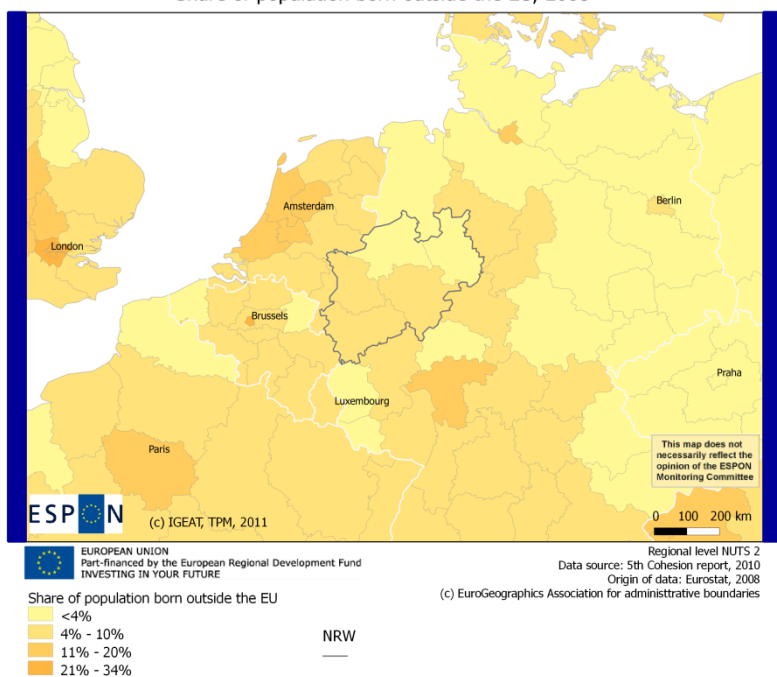
a) Comparative analysis globalisation

Globalisation									
<i>Indicator</i>	<i>value</i>		<i>EU</i>		<i>National</i>		<i>Neighbourhood</i>		<i>Typology</i>
Population born outside the EU, 2006	6%	92			111		94		
Internet access, 2009	72%	143			113		109		
Expenditure on R&D, 2007	1.70%	102			77		81		
Relative number of patents, 2005	0.10%	225		↓	94		↓ 102		↓
<i>Average salary per economic sector, 2008</i>									
Manufacturing (C)	40,796 €	175			103		139		
Information, communication (J)	40,900 €	135			104		98		
Professional, scientific, technical activities (M)	28,060 €	122			105		113		
<i>Employment per economic sector, 2008</i>									
Manufacturing (C)	13.97 %	124			118		145		

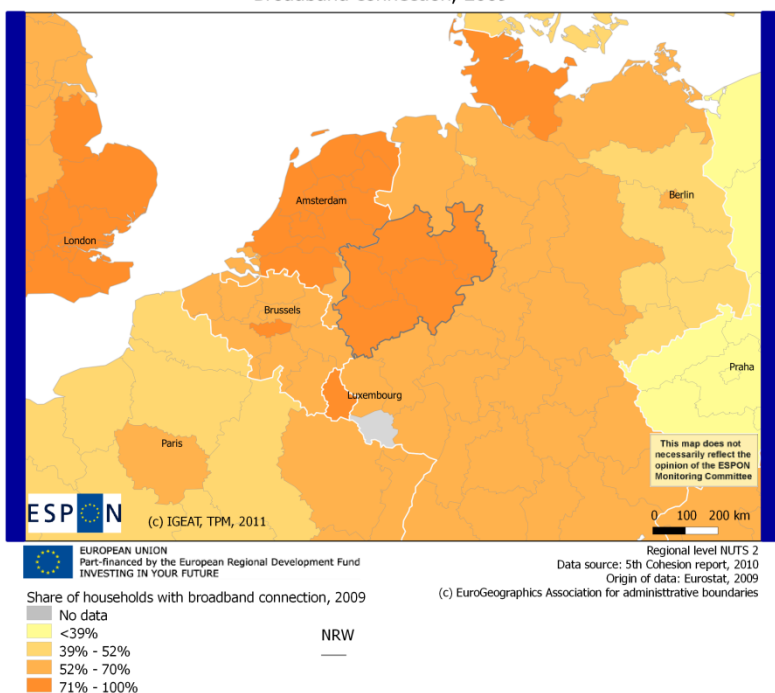
Information, communication (J)	3.5%	64			141			164		
Professional, scientific, technical activities (M)	5%	87			110			104		
Tourism occupancy, 2009	28.7%	130			108			138		
Tourism non-residents, 2009	22.9%	57			133			123		
Daily population accessible by car, 1999	61,267	2.55			1.73					
Migration into NUTS 3 regions, 2001-2007	0.5	-0.44			0.17					
Accessibility to passenger flights, 2004	1,339	1.23			0.7					
Tertiary education, 2007	17.2%	85			86			83		
Early school leavers, 2007	11.8%	86			121			107		
Unemployment rate, 2009	7.8%	87			102			126		
Change in unemployment rate, 2000-2009	+30%	128			136			116		

b) Regional maps globalisation

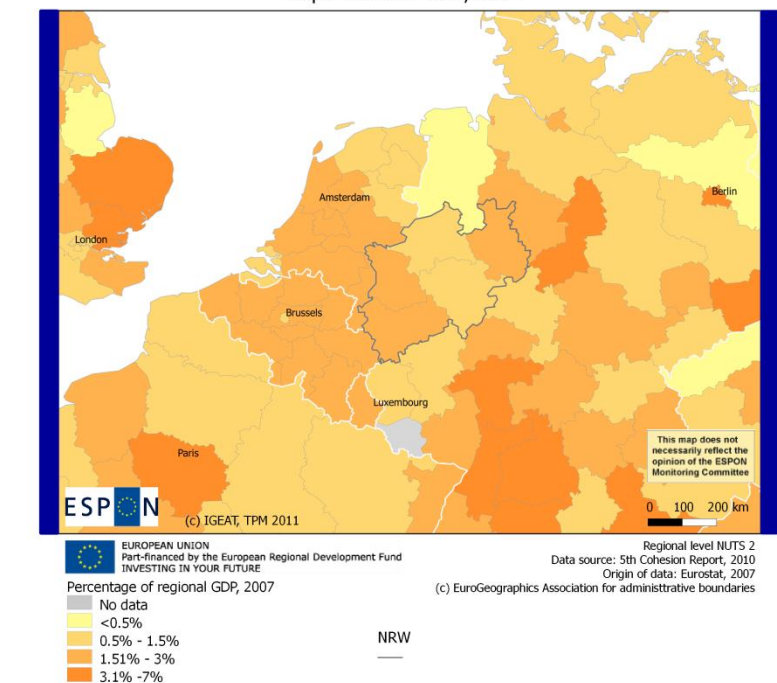
Share of population born outside the EU, 2008



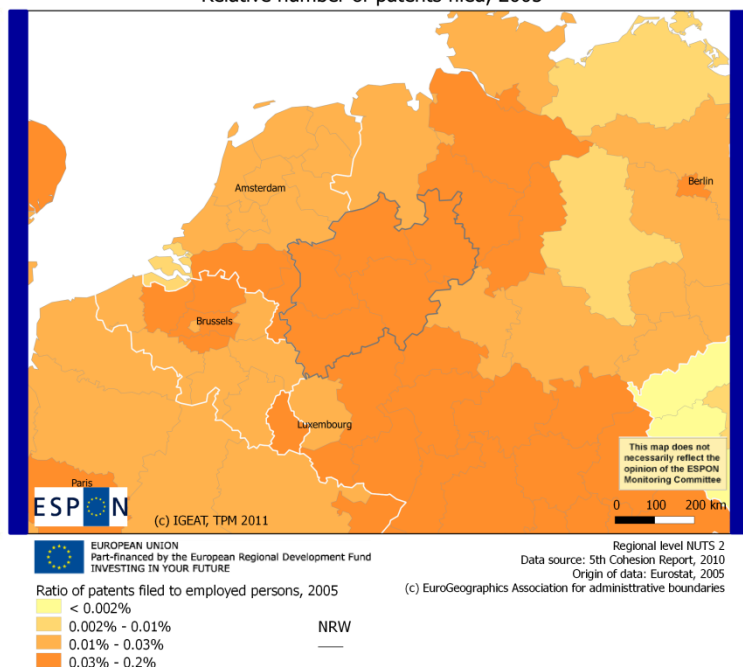
Broadband connection, 2009



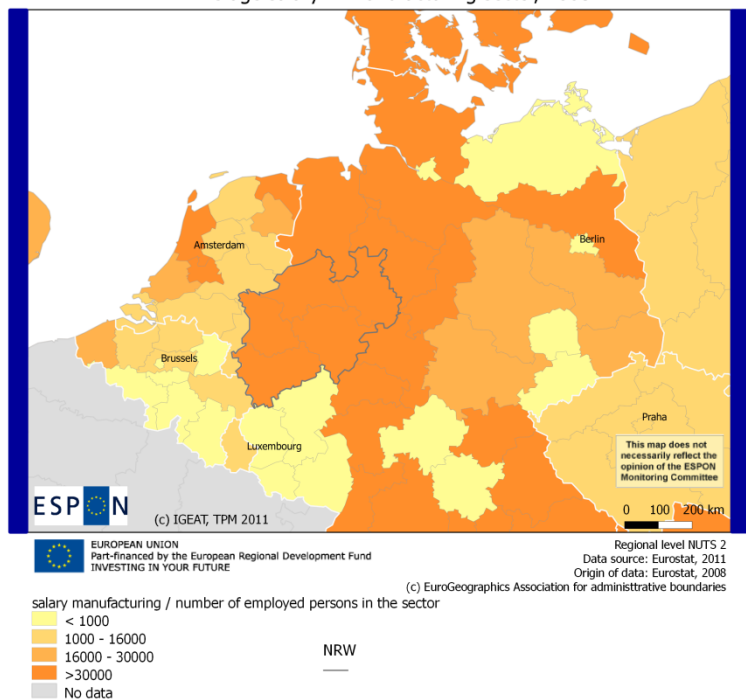
Expenditure in R&D, 2007



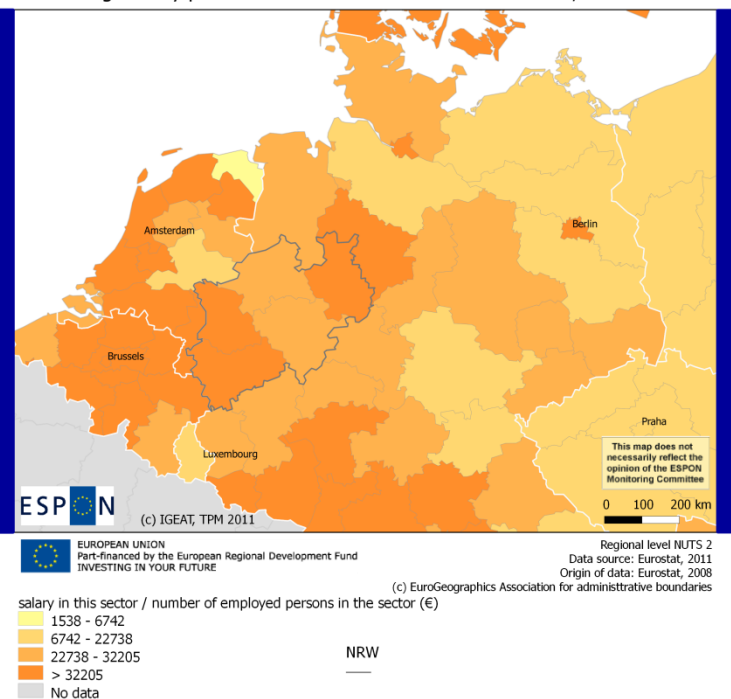
Relative number of patents filed, 2005



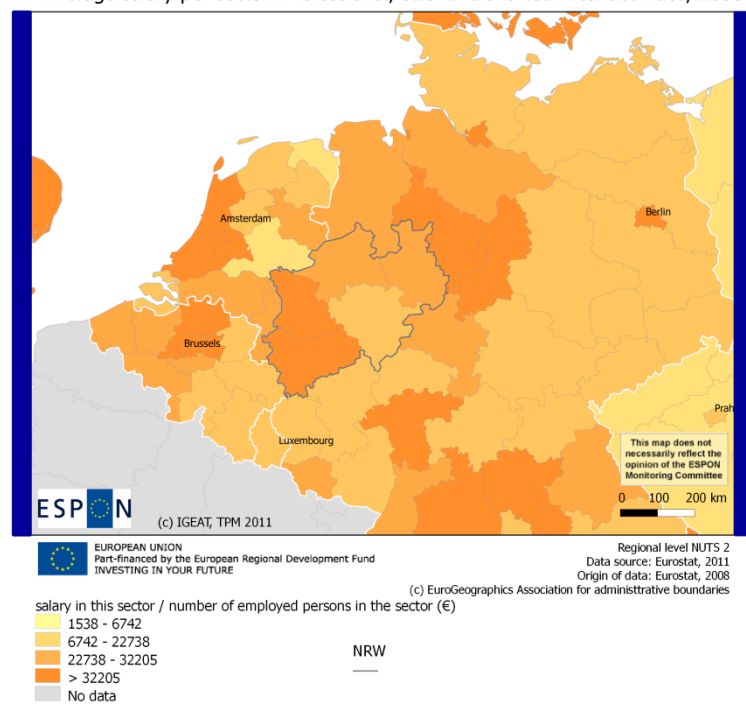
Average salary in manufacturing sector, 2008



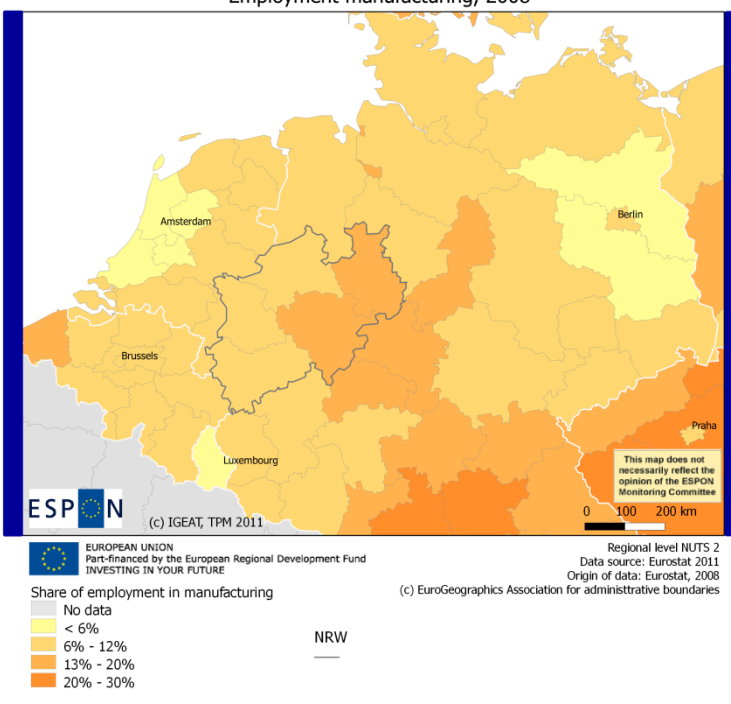
Average salary per sector: information and communication, 2008



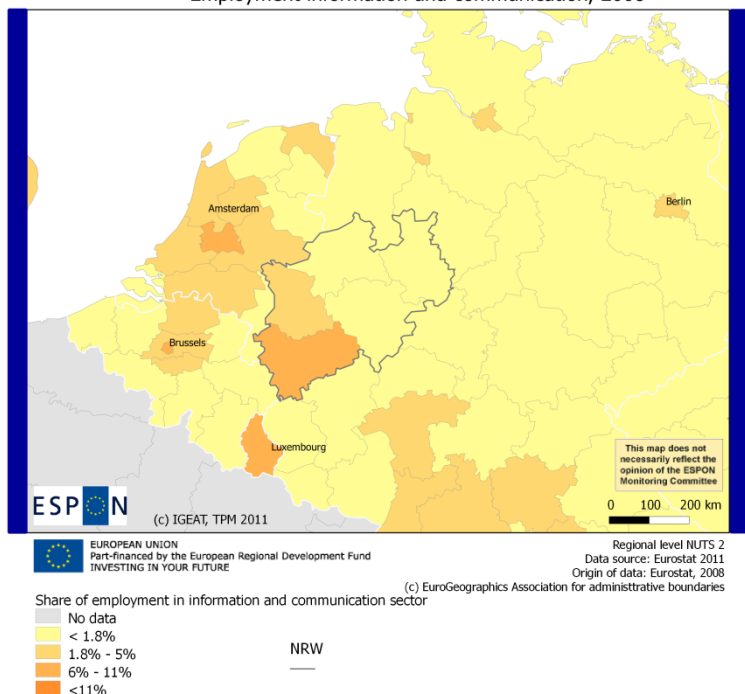
Average salary per sector: Professional, scientific and technical activities, 2008



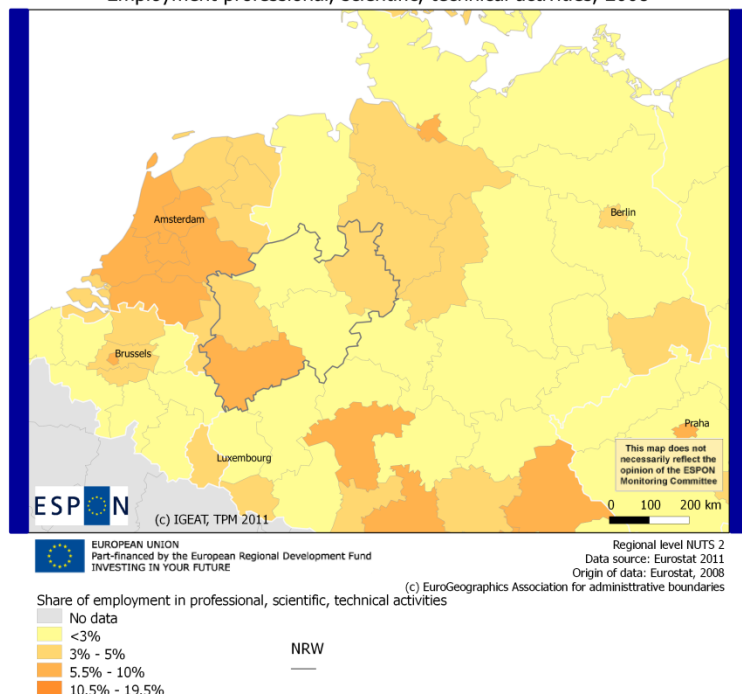
Employment manufacturing, 2008



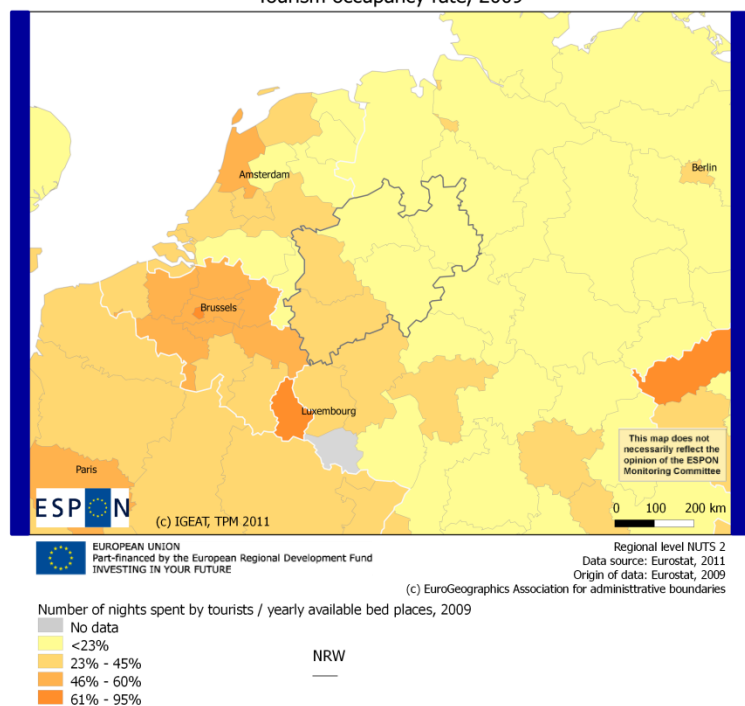
Employment information and communication, 2008



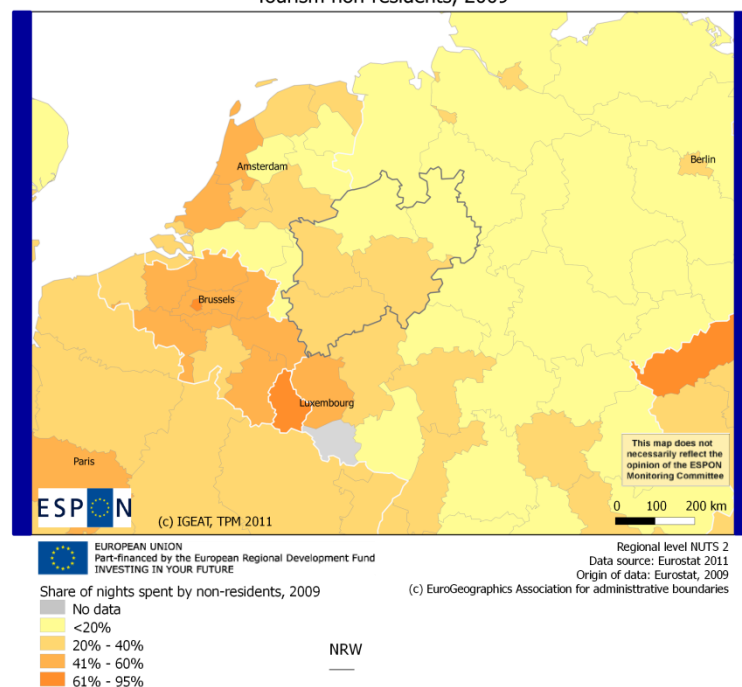
Employment professional, scientific, technical activities, 2008



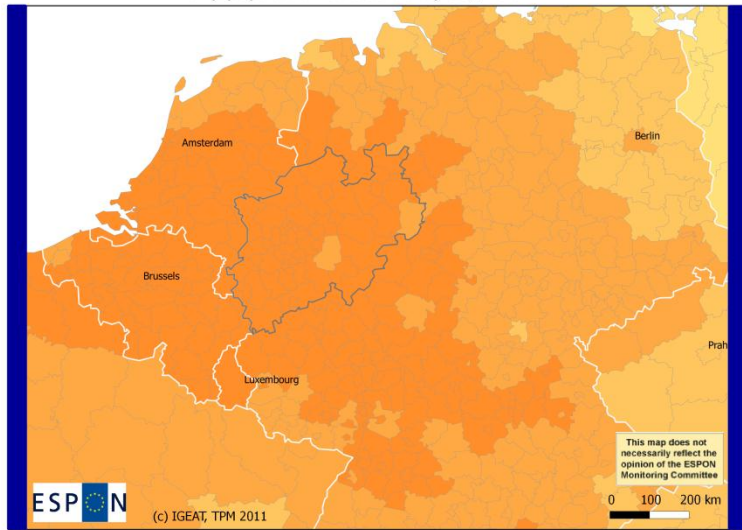
Tourism occupancy rate, 2009



Tourism non-residents, 2009



Daily population accessible by car, 2004



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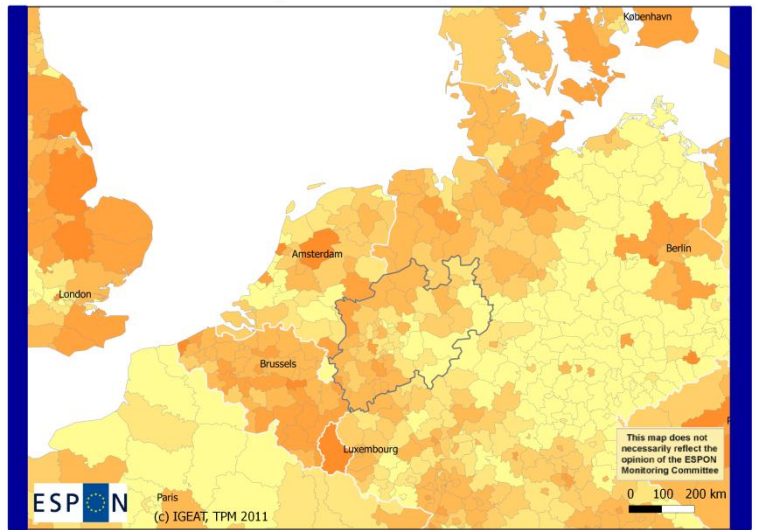
daily population accessible by car, 2004

< 2500
2500 - 9000
9000 - 20000
20000 - 40000
> 40000

NRW

Regional level NUTS 3
Data source: ESPON 2013 Database
Origin of data: ESPON Project EDORA, 2004
(c) EuroGeographics Association for administrative boundaries

Net migration NUTS 3 regions, 2001-2007



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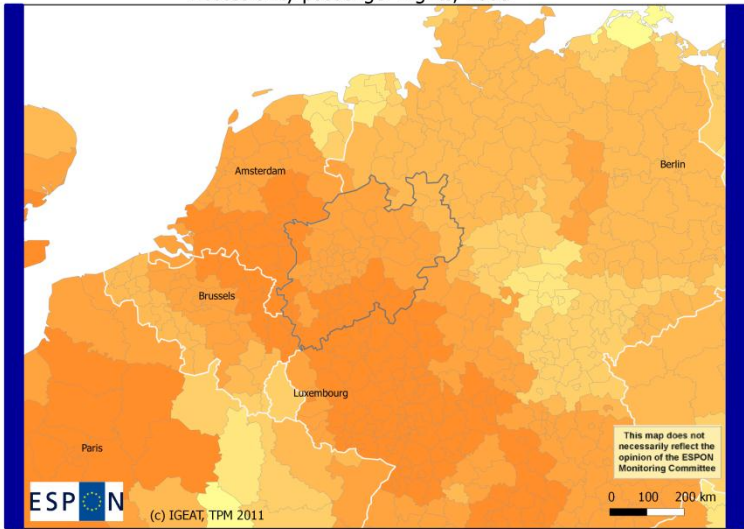
net migration per million inhabitants (annual average)

< -1.5
-1.5 - 0
0 - 1.5
1.5 - 5
5 - 10
> 10

NRW

Regional level NUTS 3
Data source: 5th Cohesion Report, 2010
Origin of data: Eurostat, ESPON
(c) EuroGeographics Association for administrative boundaries

Accessibility passenger flights, 2008



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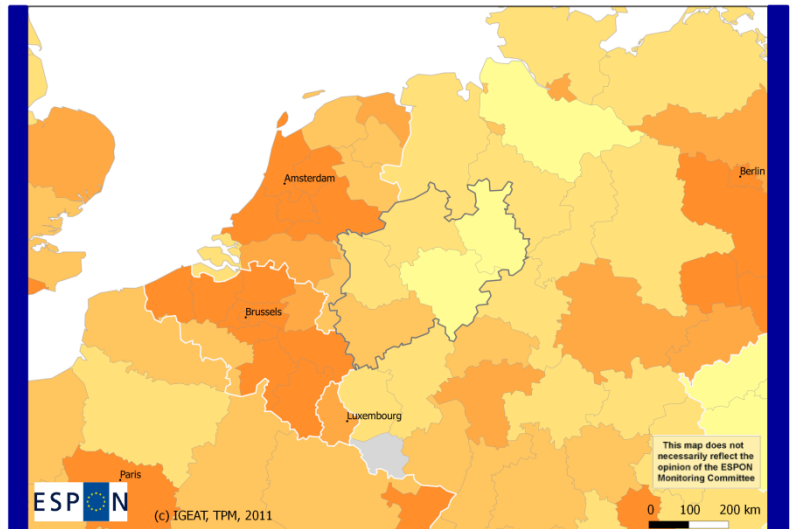
Population weighted average of passenger flights per day
travel time to the closest airport < 90 min

0 - 50
50 - 150
150 - 350
350 - 800
800 - 1500
1500 - 3500

NRW

Regional level NUTS 3
Data source: ESPON 2013 Database
Origin of data: ESPON Project TIPTAP, 2010
(c) EuroGeographics Association for administrative boundaries

Share of population with tertiary education, 2009



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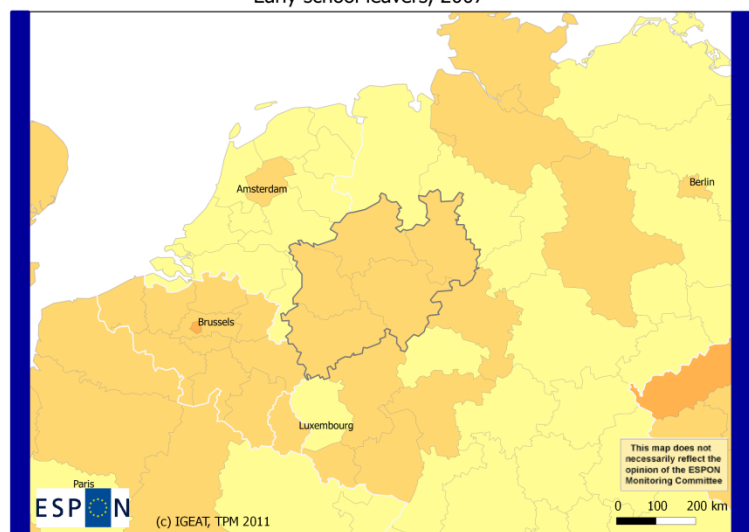
Share of population with tertiary education

No data
<15%
15% - 19%
20% - 22%
23% - 26%
27% - 41%

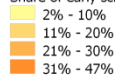
NRW

Regional level NUTS 2
Data source: 5th Cohesion report, 2010
Origin of data: Eurostat, 2009
(c) EuroGeographics Association for administrative boundaries

Early school leavers, 2007

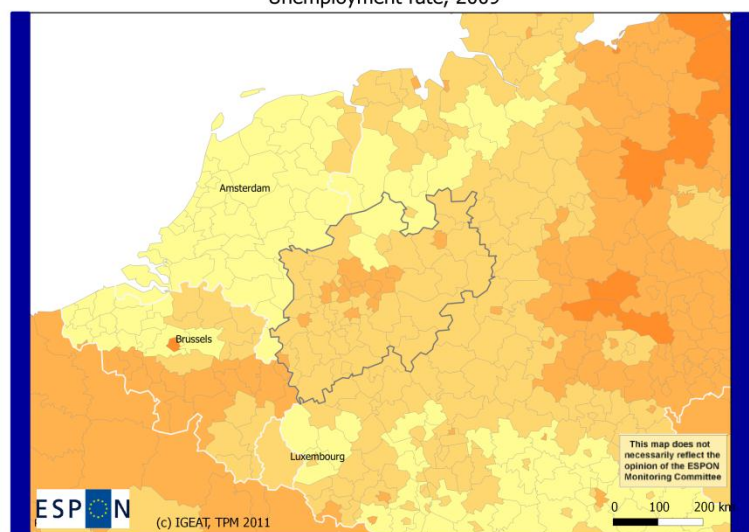


Share of early school leavers of population aged 18-24, 2007



NRW

Unemployment rate, 2009

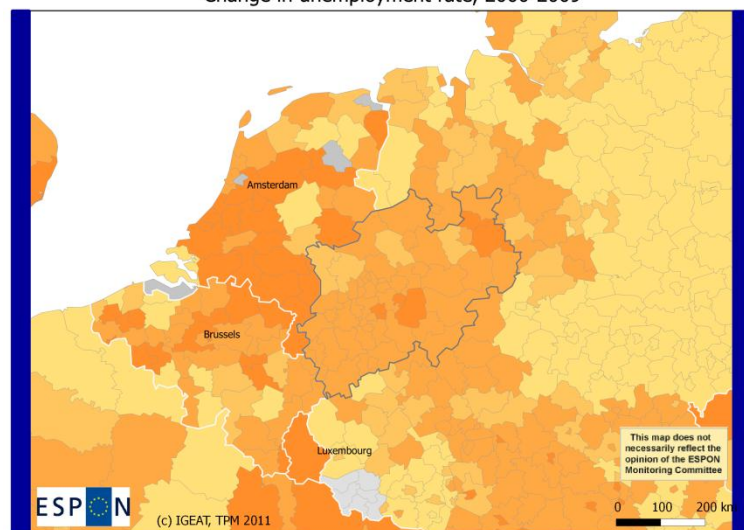


Unemployment rate of population older than 15, 2009

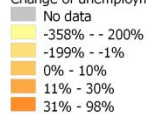


NRW

Change in unemployment rate, 2000-2009



Change of unemployment rate 2001-2009



NRW

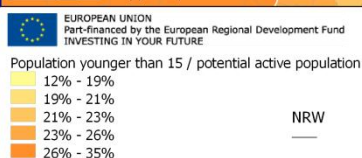
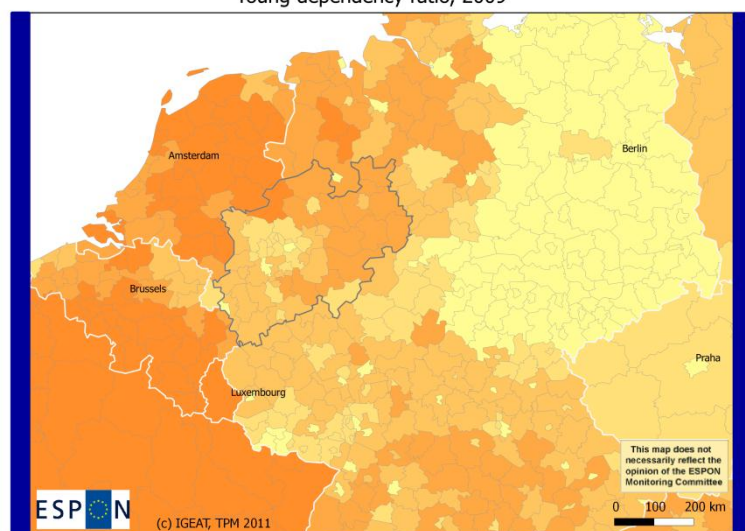
4.2 Demography

a) Comparative analysis

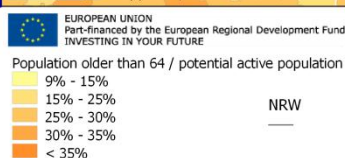
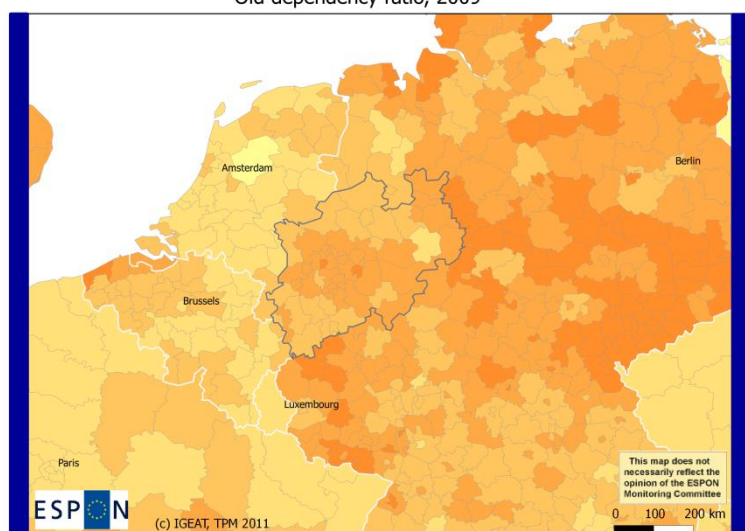
Demography									
Indicator	value		EU	National		Neighbourhood		Typology	
Young age dependency ratio, 2009	22%	93		105		92		94	
Old age dependency ratio	31%	120		99		109		110	
Life expectancy, 2004	78.6	0.86		-				-	
Median age, 2008	41.4	-		0.13				-	
Population growth, 1999-2009	0%	96		100		98		99	

b) Regional maps demography

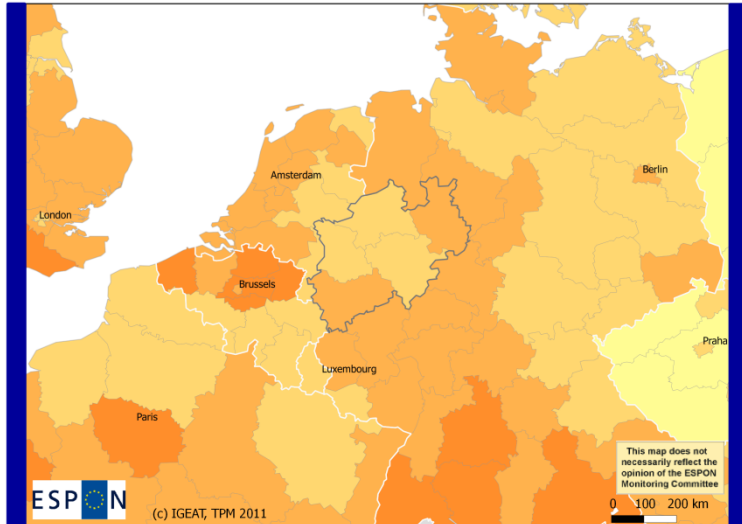
Young dependency ratio, 2009



Old dependency ratio, 2009



Life expectancy at birth, 2004



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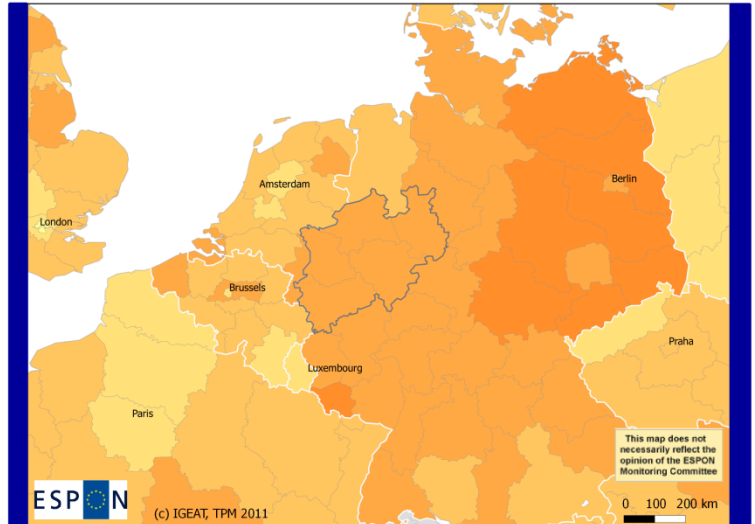
number of years that a newborn is expected to live

- 70 - 75
- 75 - 78
- 78 - 80
- 80 - 82

NRW

Regional level NUTS 2
Data source: ESPON 2013 Database
Origin of data: ESPON DEMIFER Project, 2010
(c) EuroGeographics Association for administrative boundaries

Median Age, 2008



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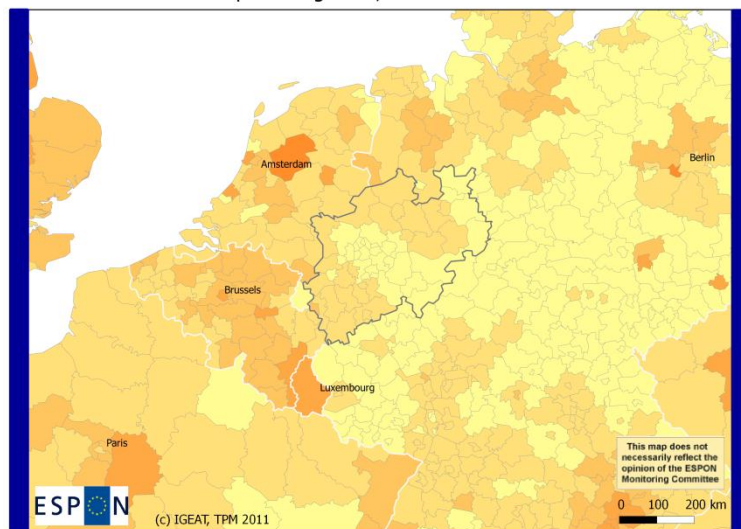
age that divides a population into two numerically equal groups

- 31 - 34
- 34 - 37
- 37 - 39
- 39 - 43
- 43 - 46
- No data

NRW

Regional level NUTS 2
Data source: Eurostat, 2011
Origin of data: Eurostat, 2008
(c) EuroGeographics Association for administrative boundaries

Population growth, 1999-2009



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change in population 2009/1999

- < 0 %
- 0 - 5 %
- 5 - 10 %
- 10 - 15 %
- >15 %







NRW

Regional level NUTS 3
Data source: Eurostat, 2011
Origin of data: Eurostat, 1999, 2009
(c) EuroGeographics Association for administrative boundaries

4.3 Climate Change

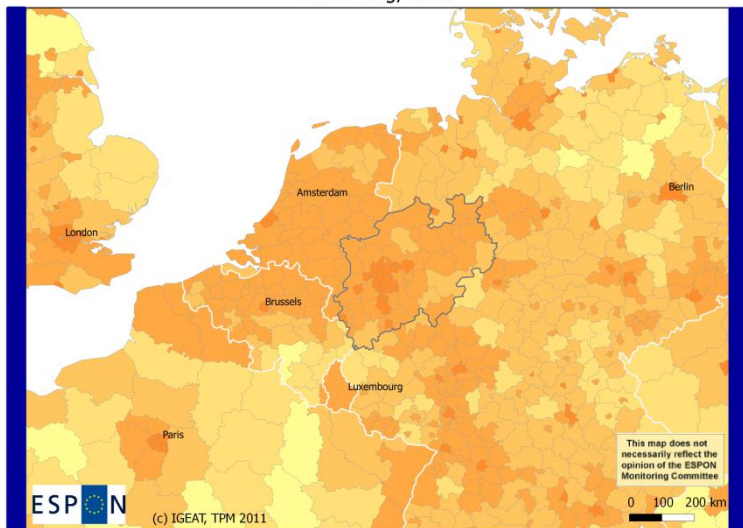
a) Comparative analysis

Climate Change									
Indicator	value		EU	National		Neighbourhood		Typology	
Soil sealing, 2006	9.3%	440		195		190		99	
NATURA 2000 areas, 2009	8.40%	50		55		60		73	
Concentration of particulate matter on surface level, 2009	21.13 µg/m³	-1.3		-0.84				-1.39	
Ozone exceedance days, 2008	13.3 days	-0.32		-0.61				-0.52	
Potential energy consumption for heating, 1981-2009	-13%	101		101		100		102	
Change in minimum temperature January 1994-2008	+4.6°C	-0.62		-0.17				-0.79	
Change in maximum temperature July 1994-2008	+3.6°C	-0.33		0.42				0.08	

Change in mean temperature January 1994-2008	+2.03°C	1.28		-0.2		-1.34	
Change in mean temperature July 1994-2008	+0.2°C	0.45		0.62		1.22	

b) Regional maps climate change

Soil sealing, 2006



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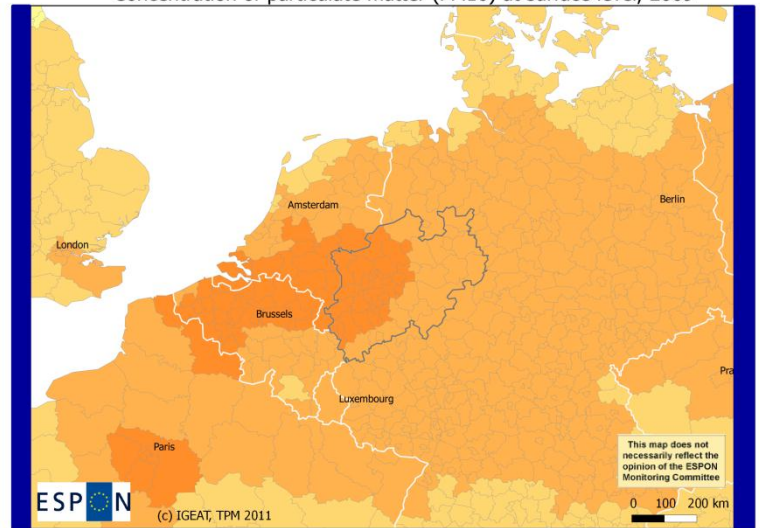
% of total NUTS 3 surface

- < 1
- 1 - 2
- 2 - 4
- 4 - 20
- 20 - 67

NRW

Regional level NUTS 3
Data source: 5th Cohesion Report, 2010
Origin of data: AEE, REGIO-GIS
(c) EuroGeographics Association for administrative boundaries

Concentration of particulate matter (PM10) at surface level, 2009



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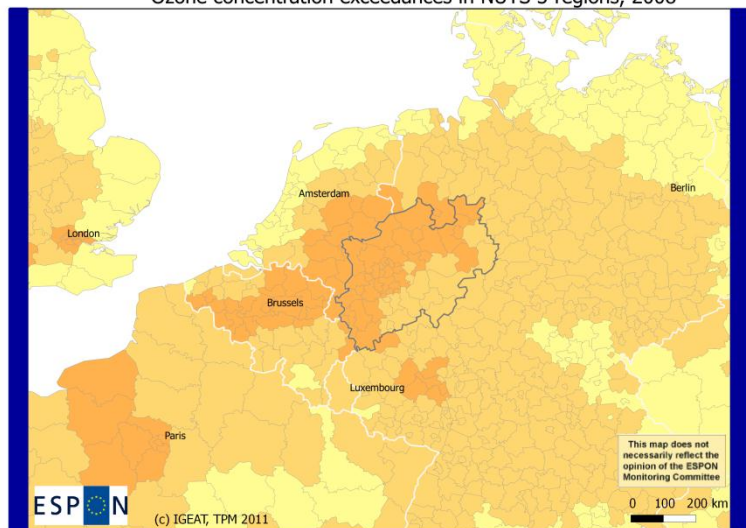
annual average (µg/m³)

- < 10
- 10 - 15
- 15 - 20
- > 20

NRW

Regional level NUTS 3
Data source: 5th Cohesion Report, 2010
Origin of data: GMES-Promote, CCR, EFGS, REGIO-GIS
(c) EuroGeographics Association for administrative boundaries

Ozone concentration exceedances in NUTS 3 regions, 2008



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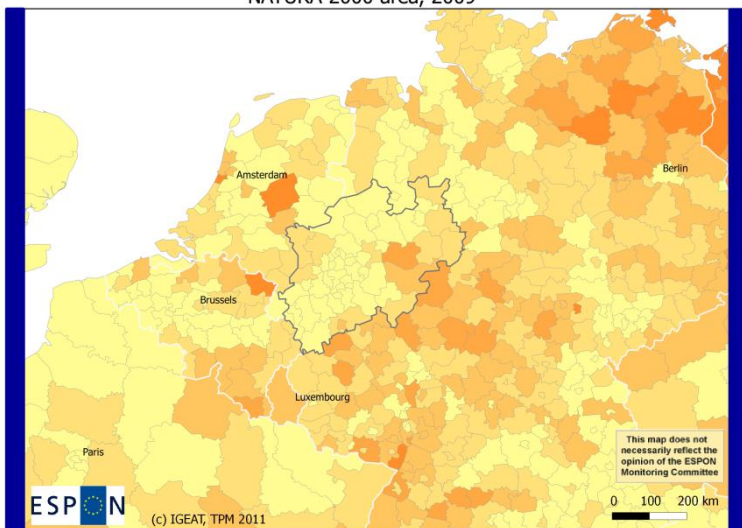
days exceeding 120 $\mu\text{g}/\text{m}^3$

- < 5
- 5 - 10
- 10 - 30
- > 30

NRW

Regional level NUTS 3
Data source: 5th Cohesion Report, 2010
Origin of data: GMES-Promote, Eurostat, CCR, REGIO-GIS
(c) EuroGeographics Association for administrative boundaries

NATURA 2000 area, 2009



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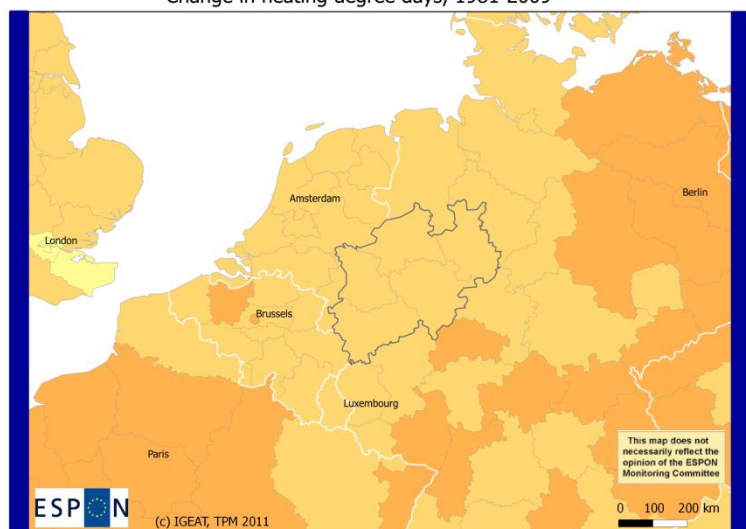
% of total NUTS 3 surface

- < 7
- 7 - 16
- 16 - 27
- 27 - 39
- 39 - 74

NRW

Regional level NUTS 3
Data source: 5th Cohesion Report, 2010
Origin of data: AEE, REGIO-GIS
(c) EuroGeographics Association for administrative boundaries

Change in heating degree days, 1981-2009



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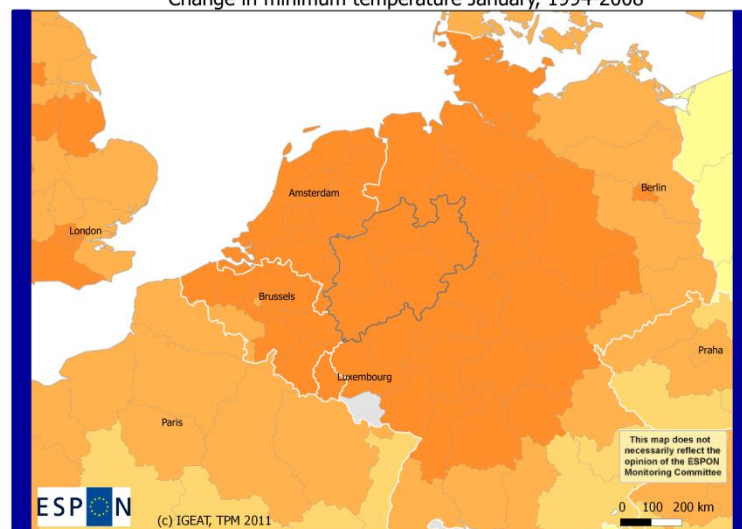
Change in Heating Degree Days, 1981-2009

- No data
- 70% - -21%
- 20% - -11%
- 10% - -1%
- 0% - 11%

NRW

Regional level NUTS 2
Data source: ESPON 2013 Database
Origin of data: Eurostat, 2009
(c) EuroGeographics Association for administrative boundaries

Change in minimum temperature January, 1994-2008



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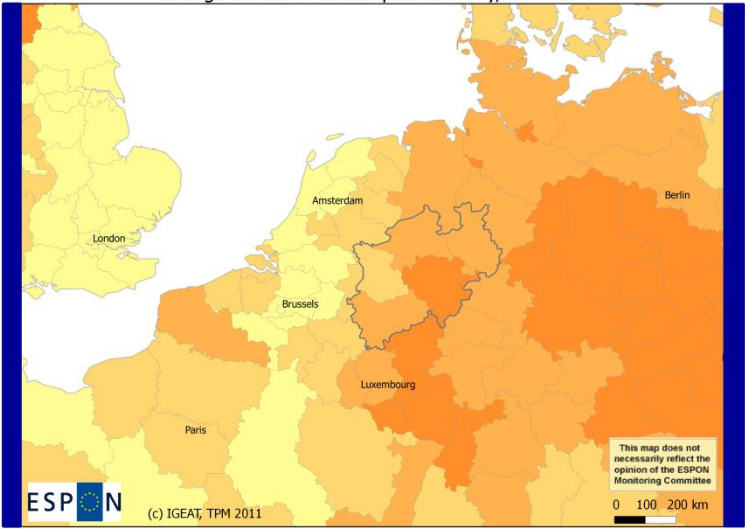
Change in minimum temperature January ($^{\circ}\text{C}$)

- < -1.4 $^{\circ}\text{C}$
- 1.4 $^{\circ}\text{C}$ - +0.4 $^{\circ}\text{C}$
- +0.4 $^{\circ}\text{C}$ - +2.9 $^{\circ}\text{C}$
- > +2.9 $^{\circ}\text{C}$
- No data

NRW

Regional level NUTS 2
Data source: ESPON 2013 Database
Origin of data: ReRisk ESPON Project, 2010
(c) EuroGeographics Association for administrative boundaries

Change in maximum temperature July, 1994-2008



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Change in maximum temperature July (°C)

- 2.8°C - 0°C
- 0°C - +0.8°C
- +0.8°C - +1.6°C
- +1.6°C - +3.5°C

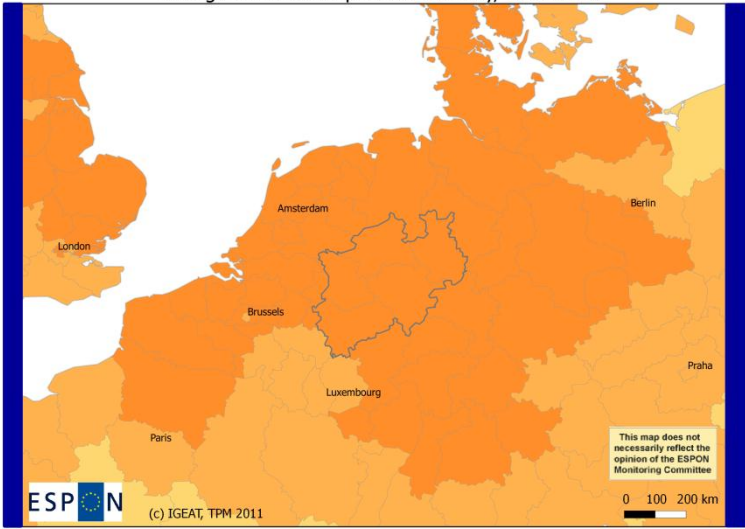
NRW

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No data

Regional level NUTS 2
Data source: ESPON 2013 Database
Origin of data: ReRisk ESPON Project, 2010
(c) EuroGeographics Association for administrative boundaries

Change in mean temperature January, 1994-2008



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Change in mean temperature January (°C)

- 1.5°C - -0.1°C
- 0.1°C - +0.9°C
- +0.9°C - +1.6°C
- +1.6°C - +2.8°C

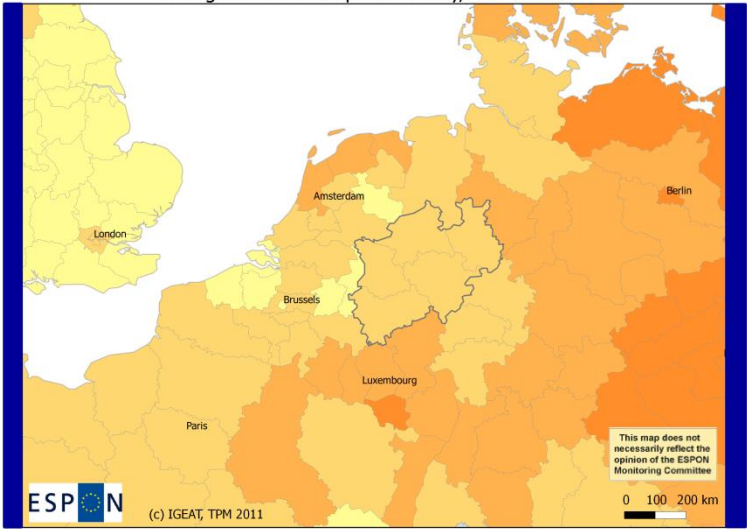
NRW

—

No data

Regional level NUTS 2
Data source: ESPON 2013 Database
Origin of data: ReRisk ESPON Project, 2010
(c) EuroGeographics Association for administrative boundaries

Change in mean temperature July, 1994-2008



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Change in mean temperature July (°C)

- 0.7°C - 0°C
- 0°C - +0.3°C
- +0.3°C - +0.6°C
- +0.6°C - +1.7°C

NRW













—

No data

Regional level NUTS 2
Data source: ESPON 2013 Database
Origin of data: ReRisk ESPON Project, 2010
(c) EuroGeographics Association for administrative boundaries

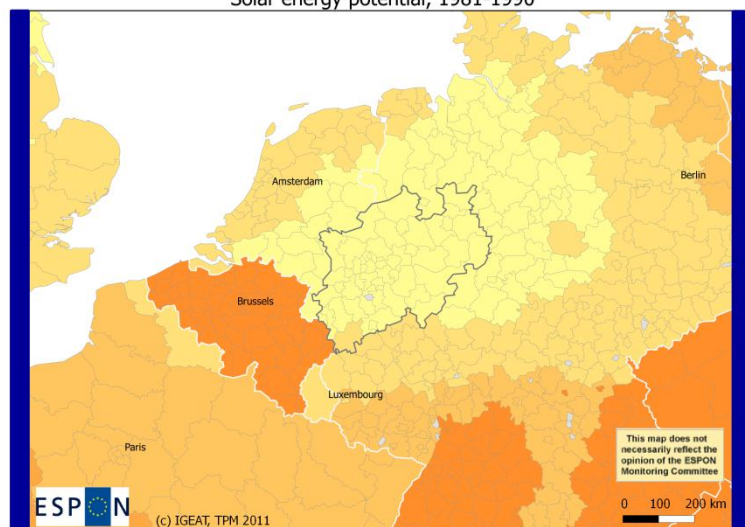
4.4 Energy

a) Comparative analysis

Energy						
<i>Indicator</i>	<i>value</i>	<i>EU</i>	<i>National</i>	<i>Neighbourhood</i>	<i>Typology</i>	
Solar energy resources, 1981-1990	1091 kWh/m ²	-0.47 	-0.12 		-0.11 	
Wind energy potential, 2005	1654h	0.24 	0.09 		-0.19 	
Fuel costs of freight traffic as % of GDP, 2005	1.8%	0.31 	0.18 		0.06 	
Employment in energy intensive industries, 2005	0.32%	-0.27 	-0.85 		0.1 	

b) Regional maps energy

Solar energy potential, 1981-1990



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Solar energy potential NUTS 3 regions (kWh per year)

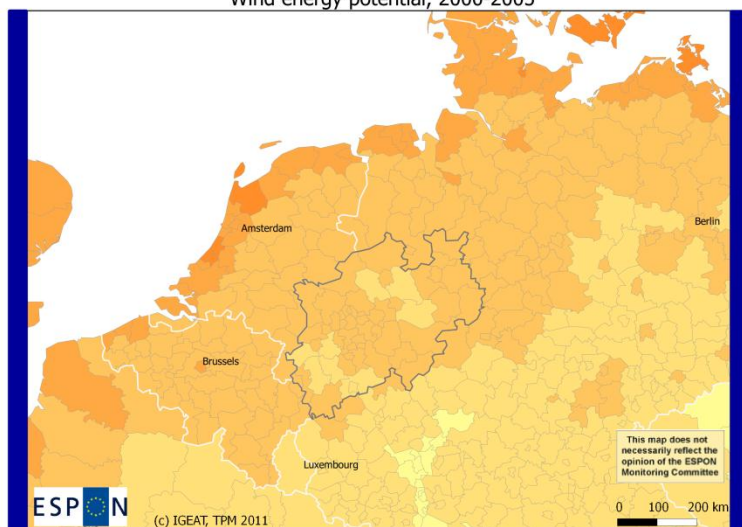
- < 1100
- 1100 - 1160
- 1160 - 1312
- 1312 - 1571
- > 1571
- No data

Regional level NUTS 3
Data source: 5th Cohesion Report, 2010
Origin of data: CCR

(c) EuroGeographics Association for administrative boundaries

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Wind energy potential, 2000-2005



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Wind energy potential NUTS 3 regions (h per year)

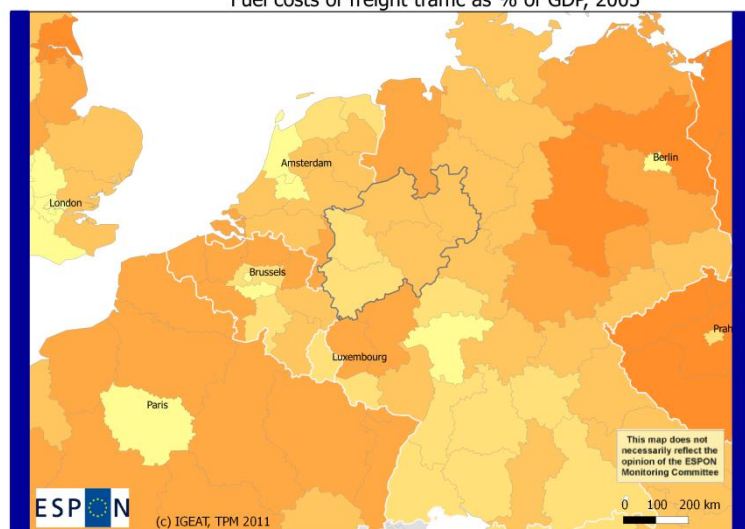
- < 1000
- 1000 - 1500
- 1500 - 2000
- 2000 - 3000
- > 3000
- No data

Regional level NUTS 3
Data source: 5th Cohesion Report, 2010
Origin of data: EEA TC-ACC, REGIO-GIS

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Fuel costs of freight traffic as % of GDP, 2005



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Fuel costs of freight traffic as % of GDP

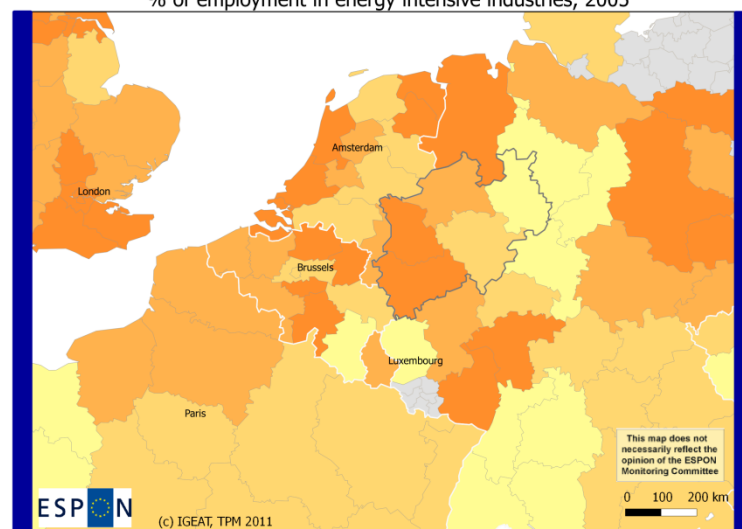
- < 0.8%
- 0.8% - 1.8%
- 1.8% - 2.3%
- 2.3% - 3.5%
- 3.5% - 14%
- No data

Regional level NUTS 2
Data source: ESPON 2013 Database
Origin of data: ESPON Project ReRisk, 2010

(c) EuroGeographics Association for administrative boundaries

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% of employment in energy intensive industries, 2005



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% of employment in energy intensive industries

- < 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.7
- No data

Regional level NUTS 2
Data source: ESPON 2013 Database
Origin of data: ESPON Project ReRisk, 2010

(c) EuroGeographics Association for administrative boundaries

NRW

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The ESPON 2013 Programme is part-financed by the European Regional Development Fund, the EU Member States and the Partner States Iceland, Liechtenstein, Norway and Switzerland. It shall support policy development in relation to the aim of territorial cohesion and a harmonious development of the European territory.

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