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PART 7/13

COMMISSION STAFF WORKING DOCUMENT
Accompanying the document

REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

My region, My Europe, Our future:
The seventh report on economic, social and territorial cohesion

{COM(2017) 583 final}

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CHAPTER 3 - TERRITORIAL COHESION

Table of Contents

KEY MESSAGES

- Substantial progress has been made in the EU in limiting energy consumption and greenhouse emissions. Most Member States are close to reaching the targets set under the Europe 2020 strategy.
- Part of the progress, however, is explained by the slowdown in economic activity during the crisis and there is a risk that the current recovery will make it more difficult to maintain momentum towards meeting the targets.
- In transport, there needs to be a major shift towards using less energy, cleaner kind of modes and more efficient use of infrastructure to reach the EU objectives for greenhouse gas emissions.
- The impact of climate change is likely to be considerable for a number of EU regions, particularly the outermost regions, regions around the Mediterranean, along coastlines generally and mountainous ones.
- Adapting to changes caused by global warming is generally costly and further investment is needed to make EU regions and cities more resilient to the consequences of the changes concerned.
- Despite general progress in reducing environmental pressures (notably as regards waste water and waste treatment), more efforts are needed to meet key environmental objectives of the EU.
- Pollution is often more of a problem in cities than in other areas. Air pollution is a particular concern and nature-based solutions, such as the development of green urban spaces, can provide an efficient means of mitigating the problem.
- Cities can also be more efficient in the use of resources than other places and can make it possible to adopt a low-carbon life style.
- Cross-border cooperation, a major policy objective of the EU, has helped to mitigate the adverse effects of internal borders, Support for cooperation has led to improvements in cross-border security and concrete achievements in transport, education, energy, healthcare, training and other areas.
- National borders, however, still constitute obstacles to the movement of goods, services, people, capital and ideas and substantial gains to the regions concerned as well as to the EU as a whole could be obtained if the remaining restrictions were removed.

3.1. INTRODUCTION

As argued in the 5th Cohesion Report, territorial cohesion highlights various issues which are central to cohesion policy. Among these are the environmental dimension of sustainable development and the promotion of a flexible functional geographies approach to territorial development. The latter aims to adapt the geographical level of analysis and implementation of policy to the challenges to be addressed. Depending on the issue at stake, this ranges from macro regions, such as the Baltic Sea or the Danube region, to metropolitan and cross-border areas. This chapter therefore covers the major environmental challenges affecting the development of EU regions, on the one hand, and a number of major issues addressed by various territorial cooperation schemes, on the other.

Environmental challenges are increasing in number and importance. Global warming and the associated climate change is likely to have fundamental consequences for the EU economies and societies, notably with the increase in the frequency of extreme natural events that is expected to accompany the general rise in temperature. The extension of human settlements, built-up areas and industrial activities accentuates the pressure on the environment with effects notably in the form of air pollution, a deterioration in the quality of water bodies and the fragmentation of natural habitat, while the production of waste has reached levels which require a radical change in approach.

A large share of cohesion policy resources has always been invested in measures to improve the quality of the environment or to tackle key environmental challenges. The policy is geared towards supporting the shift to a low-carbon economy while at the same helping Member States and regions to improve their capacity to mitigate the negative impact of climate change.

Cohesion policy invests heavily in the installation of facilities to improve the quality of drinking water and to treat wastewater and in waste management and recycling schemes as well as in measures to increase energy efficiency. It also helps to develop ’green’ infrastructure across the EU and to establish a network of protected natural areas as part of Natura 2000, while supporting a shift towards more environmentally-friendly modes of transport, all with the objective of .ensuring a sustainable path of development throughout the EU.

For the 2014-2020 period, around EUR 78 billion of Cohesion Policy funding has been allocated to supporting the shift towards a low-carbon economy (thematic objective 4), adaption to climate change and risk prevention (thematic objective 5) and improving environmental protection and resource efficiency (thematic objective 6). This amounts to almost a third of ERDF and Cohesion Fund resources, the two sources of financing most concerned with environmental issues.

Territorial Cooperation is a key objective of cohesion policy, focusing on joint action and exchange of policy ideas and experience between national, regional and local authorities in different EU Member States. It helps to reduce the obstacles to development which stem from national borders and supports the adoption of common strategies to solve common problems. Around EUR 10 billion have been allocated to such cooperation for the 2014-2020 period.

3.2. ENERGY UNION AND CLIMATE CHANGE

The EU has the objective of making a transition to a low-carbon economy and of ensuring that Europe has access to secure, affordable and climate-friendly energy. The Energy Union is a European priority project in which five dimensions are closely interlinked: energy security, solidarity and trust; a fully integrated European energy market; energy efficiency to moderate demand; action on climate change to decarbonise the economy; and research, innovation and competitiveness.

As part of this, targets have been set for reducing greenhouse gas emissions progressively up to 2050. These are included in both the 2020 climate and energy package and the 2030 climate and energy framework.

The 2020 climate and energy package is aimed at achieving a 20% cut in greenhouse gas emissions, a 20% improvement in energy efficiency (both from 1990 levels) and a 20% share of renewables in final energy consumption. The 2030 climate and energy framework is more ambitious, increasing these targets to 40% for the first and to 27% for the other two [1].

Cohesion policy plays a central role as regards the Energy Union. By helping Member States achieve EU climate and energy targets, cohesion policy investments tackle energy poverty and enhance energy security, while furthering regional development, competitiveness, growth and jobs. By supporting the Energy Union, the policy also contributes to reducing air pollution which, according to the WHO, is one of the main environmental hazards facing us.

For the 2014-2020 period, around 21% of the ERDF and Cohesion Fund resources are allocated to climate related interventions. While the ESF is by its nature less oriented towards this area, 1.4% of its resources still go towards combating the effects of climate change.

Cohesion policy supports a comprehensive range of climate-related measures, such as improving energy efficiency in public buildings, housing and small and medium-sized enterprises, smart grids; renewable energy sources; clean urban transport, railways, cycle tracks and footpaths; research on climate change and adaptation to it, including resilient infrastructure and risk prevention and management.

3.2.1. Increasing energy efficiency

Increasing energy efficiency is critical for reducing the energy dependence of the EU economies and protecting the environment. Energy efficiency can be improved at all stages of the energy chain, from generation to final consumption. EU measures focus on areas where the potential for savings is greatest, buildings, in particular. Increasing energy efficiency is one of the main objectives of the Energy Union and one of the primary targets of the Europe 2020 strategy. The aim is to lower EU primary energy consumption to less than 1483 million tonnes of oil-equivalent (Mtoe) a year and final energy consumption to less than 1086 Mtoe [2].

Between 2005 and 2015, EU primary energy consumption fell by 11% from 1713 Mtoe in 2005 to 1530 Mtoe in 2015[3] (Figure 3-1). Primary energy consumption fell in all Member States over this period, except Estonia and Poland where it increased (by 15% and 3%, respectively). Reductions were largest (20% or more) in Lithuania, Greece and Malta.

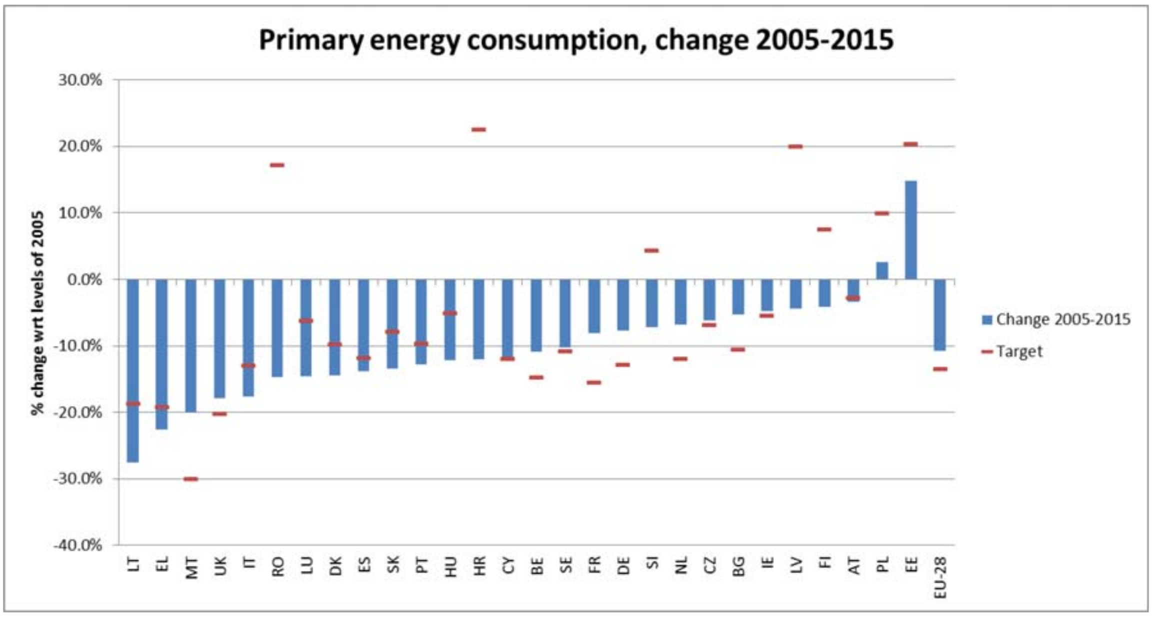
[1] On 30 November 2016, the Commission proposed an update to the Energy Efficiency Directive including a new 30% energy efficiency target for 2030.

[2] Note that these energy targets are not straight-forward to interpret in energy efficiency terms. The main determinants of energy use are GDP growth and the share of (heavy) manufacturing in the economy and in general, changes in energy consumption *per se* say very little about energy efficiency as such.

[3] Primary energy consumption is the energy supplied to industry, transport, households, services and agriculture, including generation/ transformation losses, consumption of the energy transformation sector and network losses.

In 2015, primary energy consumption in the EU as a whole was still around 3% above the 2020 target. In Malta, France, Germany, the Netherland and Bulgaria, substantial reductions in energy consumption are still needed to meet the indicative national targets set in 2013. In 18 Member States, on the other hand, consumption was already below the targets[4].

Figure 3-1 Primary energy consumption, change 2005-2015 and distance to target



Source: Eurostat

Final energy consumption in the EU fell by more than 9% between 2005 and 2015, from 1191 Mtoe to 1082 Mtoe, i.e. to slightly below the 2020 target. The largest reductions were in Greece (22%), Spain (18%) and Portugal (16%), countries in which GDP either declined over this period (Greece and Portugal) or increased relatively little. Final consumption increased only in Lithuania (by 4%), Poland (6%) and Malta (50%). Final consumption in 2015 was below the national 2020 targets in 16 Member States but still needed to be reduced further in the others, especially in Malta, Lithuania, Slovakia and Hungary.

Recent analysis shows that the reduction in energy consumption is a result not only of improvements in energy efficiency but also of structural changes in electricity generation and of the downturn in the economic activity from 2008[5]. The economic recovery now underway might, therefore, give rise to an upsurge in energy consumption across the EU if GDP growth were to be particularly high, so putting the achievement of targets at risk.

Heating and cooling in buildings and industry account for half of EU energy consumption. For the most part, the energy concerned is from fossil fuels and only 16% comes from renewables. A sharp reduction in both and in the use of fossil fuels would contribute greatly to meeting the EU's climate and energy goals. This would require significant investment which can be supported to a major extent by cohesion policy in the majority of Member States.

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4 In most cases, targets reflect the objective to reduce energy consumption by 2020. However, for some countries the target allows an increase in primary energy consumption.

5 See European Commission (2015), *Securing Energy Efficiency to Secure the Energy Union - How Energy Efficiency meets the EU Climate and Energy Goals*, JRC Science and Policy Report EU 27450.

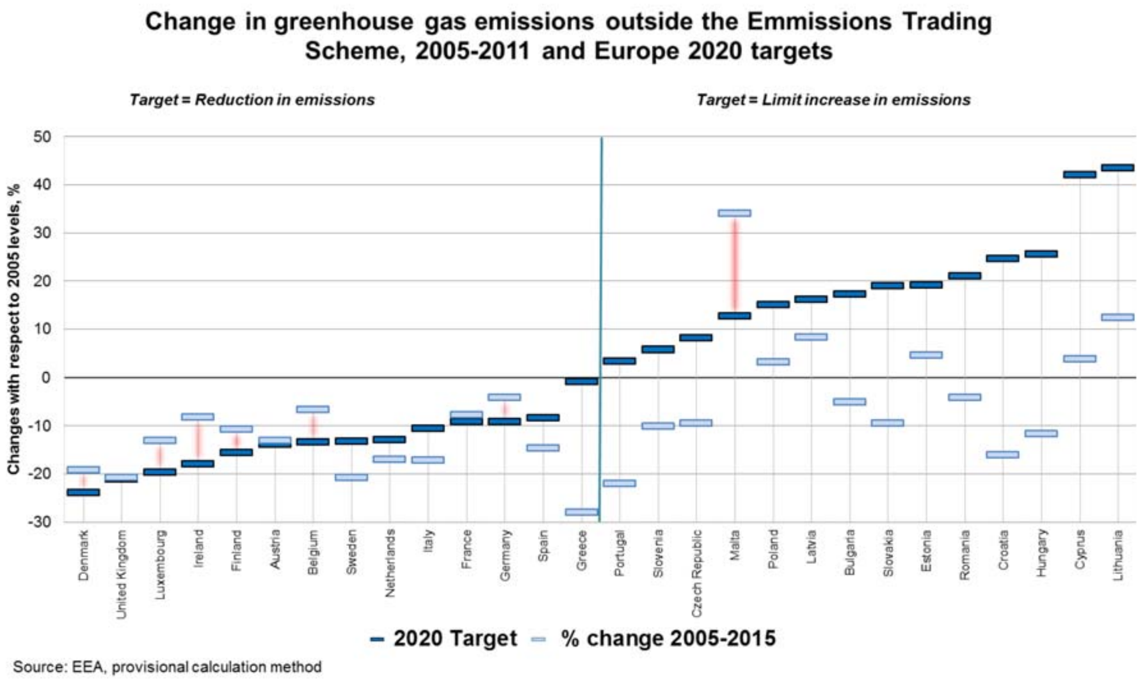
3.2.2. Reducing greenhouse gas emissions

The EU emissions trading system (ETS) is a major means of cutting greenhouse gas emissions from power and heat generation, industry and aviation, covering around 45% of such emissions in the EU. The 2020 target requires a reduction in emissions in the areas concerned of 21% on the 2005 level, while the target for 2030 requires a cut of 43%.

In the other, non-ETS sectors, namely housing, agriculture, waste and transport (excluding aviation), Member States have set binding targets for cutting emissions under the Effort Sharing Decision (ESD). These differ between countries according to their national wealth, varying from a 20% cut relative to the 2005 level for the wealthiest to a 20% increase for the least developed. To achieve the 2030 target of a 40% reduction in EU greenhouse gas emissions, the ESD areas would need a cut of 30% (relative to 2005). It is in these areas that Cohesion policy funding can help Member States to achieve their targets.

Some Member States have already reduced emissions markedly in ESD sectors (Figure 3-2). Between 2005 and 2015, they were reduced by 22% in Portugal and 27% in Greece. In other countries emissions increased, notably in Lithuania (by 12%) and Malta (by 34%). Variations in economic growth explain part of these differences, but other factors are important as well. For example, emissions were reduced by almost 21% in Sweden yet GDP grew on average by 1.7% a year over the period.

Figure 3-2 Change in greenhouse gas emissions outside the Emissions Trading Scheme, 2005-2011 and Europe 2020 targets



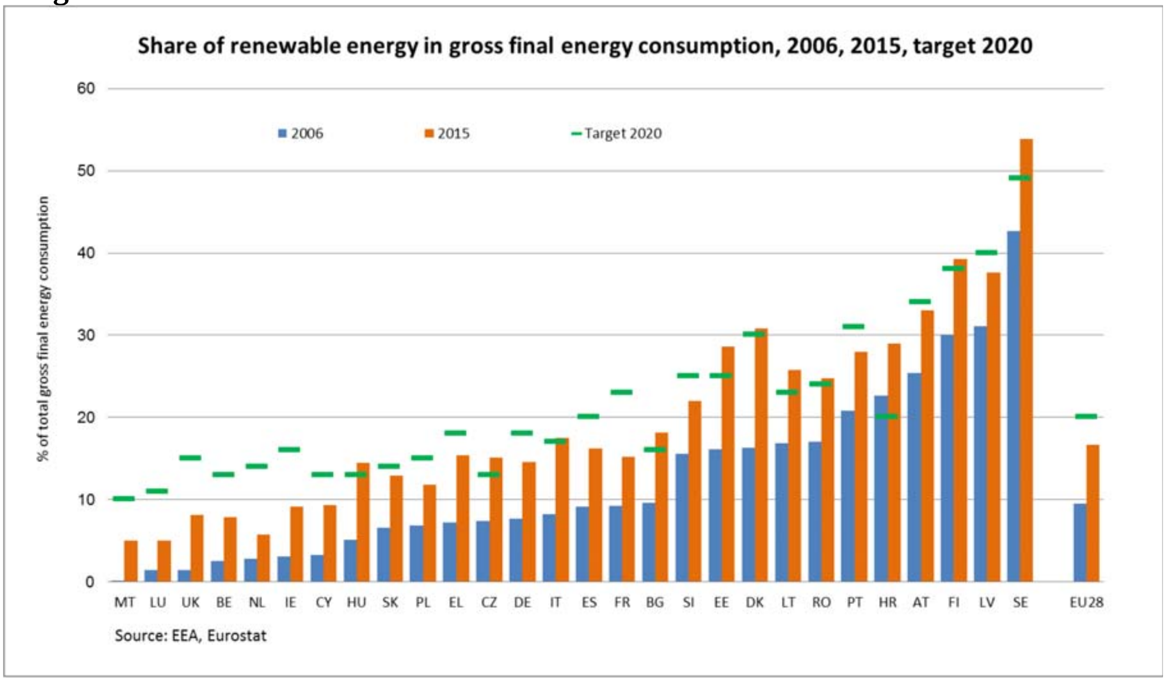
In 18 Member States, the level of emissions in 2015 was lower than the target set under the ESD, most especially in Croatia, which committed to limiting the increase in emissions to 25% relative to the 2005 level but actually cut them by 16%. Some of the other countries have gone a long way to achieving the target and have only a little more to do. In particular, in the

UK and Austria, emissions need to be reduced by less than 1%. In Ireland, on the other hand, they need to be reduced by almost 10%, while in Malta, emissions rose by much more than the increase agreed.

3.2.3. Increasing the share of renewable energy

The EU objective is to increase the share of renewables in energy consumption to 20% by 2020 (10% in the transport sector) and to 27% by 2030. Under the Renewable Energy Directive[6], EU Member States have set binding targets for increasing their national shares by 2020, which vary from 10% in Malta to 49% in Sweden, reflecting differences in both the prevailing share and the potential for expanding it. In some Member States, therefore, the share is already large - almost 54% in Sweden in 2015 and 34% in Latvia - while it is well below 10% in Malta, Luxembourg and the UK (Figure 3-3).

Figure 3-3 Share of renewable energy in gross final energy consumption, 2006, 2015, target 2020



In 2015, 11 Member States had already exceeded their targets and in another three, the share needed to be increased by less than 3 percentage points to meet them. In 10 countries, however, the required increase was more than this and in four of them – the UK, Ireland, France and the Netherlands - 7 percentage points or more.

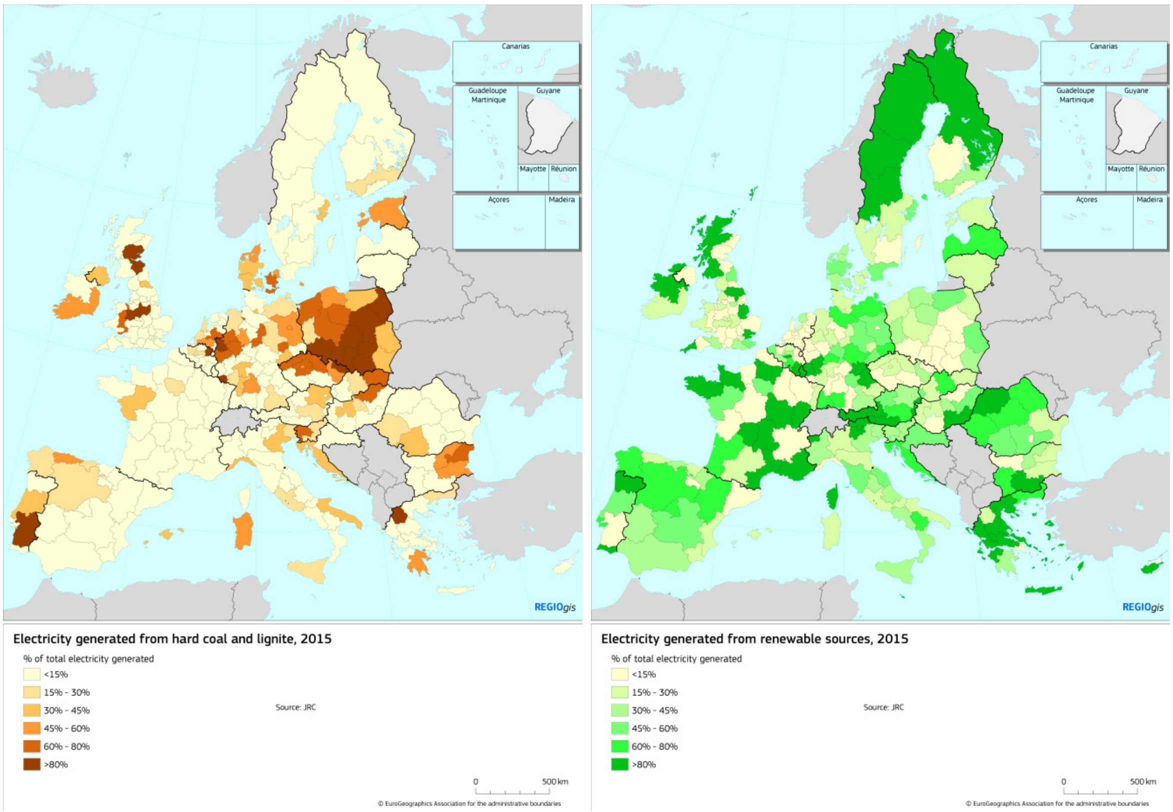
The potential of countries or regions for producing renewable energy depends on their geo-physical characteristics. For instance, coastal regions generally have a high potential for producing wind energy, especially those along the shores of the North and Baltic Seas and some Mediterranean islands. The potential for solar energy production is obviously higher where there are large amounts of sunshine, while the production of hydroelectricity also

6 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources, OJ L 140, 5.6.2009, p. 16.

requires suitable geo-physical features. Realising whatever potential exists, however, depends on the policies implemented.

Accordingly, the production of renewable energy varies markedly from one region to another. This is well illustrated by electricity production. In some regions, electricity generation is still largely dependent on coal and lignite. This is particularly the case in most regions in Poland but also in Germany, the UK, Italy, Ireland, Spain, Romania and Croatia (Map 3-1). In contrast, in other regions electricity is principally produced from renewables, notably in Cyprus, Greece, Austrian, Sweden, Finland and France, hydroelectricity, biogas, biomass and wind energy being the main sources[7].

Map 3-1 Electricity generated from hard coal and lignite - Electricity generated from renewable energies



3.2.4. Climate change

European regions differ widely in relation to the challenges they face from climate change. Mediterranean regions are likely to experience significant increases in days of extreme heat,

7 Note that renewable energy is not necessarily environment friendly: solar, wind, biomass or hydropower projects may have significantly adverse effects on e.g. biodiversity or water bodies (including through intensive land use and reduced connectivity of rivers). In consequence, strategic and integrated planning with early stakeholder involvement, in line with relevant EU legislation (SEA, EIA, WFD, Birds and Habitats Directives) is essential to maximize renewable energy production while reducing environmental impacts.

growing risk of droughts, declining crop yields and more multiple climatic hazards[8]. Coastal areas face the risk of rising sea levels, increasing sea temperatures[9] and growing numbers of 'marine dead' zones[10]. The Atlantic region will experience increasing instances of heavy rainfall and more risk of river and coastal flooding and damage from winter storms. Mountain regions are expected to suffer higher increases in temperature than the European average, a shift of plant and animal species to higher ground and a greater risk of some of them becoming extinct as well more chance of rock falls and landslides and reduced potential for hydro-electricity generation.

At the same time, climate change might create opportunities, such as an expected reduction in energy demand for heating in Northern European and Atlantic regions or new possibilities for exploiting natural resources and sea transport in Artic regions. But in general, climate change will have major adverse effects on the environment which it will be necessary, and often costly, to adapt to.

Vulnerability to climate change varies widely from one region to another. According to meta-analysis integrating assessments covering multiple areas (water, agriculture, tourism, ecosystems and so on)[11], Italy, Spain and southern and central France are likely to have the highest number of areas adversely affected, along with parts of south-eastern Europe (Map 3-2).

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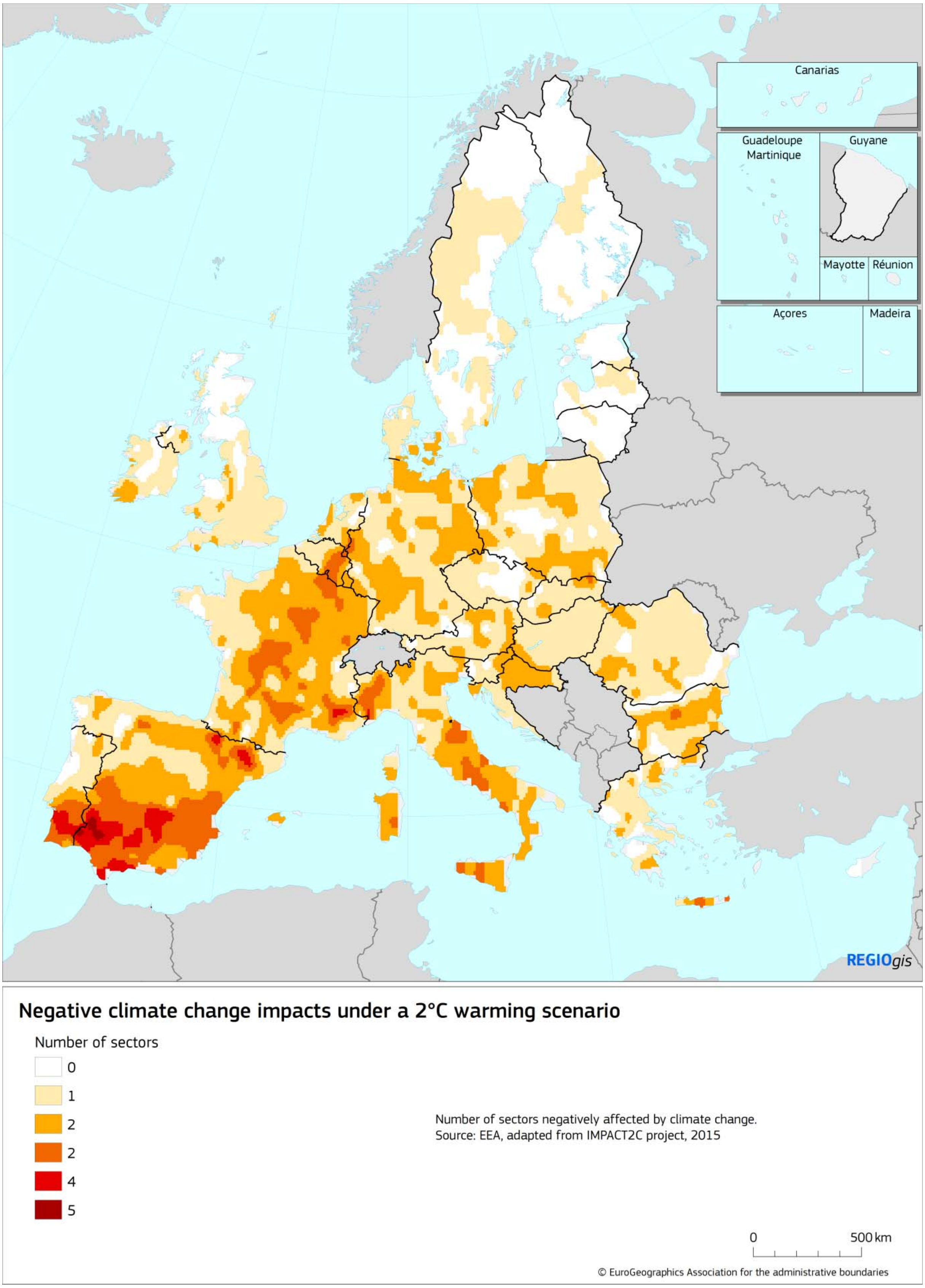
8 The number of hot days (those exceeding the 90th percentile threshold of a baseline period) has almost doubled since 1960 across Europe. Since the beginning of the 21st century, Europe has experienced several extreme heat waves (in 2003, 2006, 2007, 2010, 2014 and 2015). Under a high emissions scenario, very extreme heat waves are projected to occur as often as every other year in the second half of the 21st century (EEA (2017), *Climate change, impacts and vulnerability in Europe 2016, An indicator-based report*, EEA Report N° 1/2017).

9 An increase in sea temperature is likely to have important consequences in term of biodiversity. Wild fish stocks are responding to changing temperatures and food supply by changing their distribution which can affect local communities dependent on them.

10 Dead zones are hypoxic (low-oxygen) areas caused by excessive nutrient pollution from human activity coupled with other factors that deplete the oxygen required to support most marine life in bottom and near-bottom water.

11 See EEA (2017), *Climate change, impacts and vulnerability in Europe 2016, An indicator-based report*, EEA Report N° 1/2017 for a meta-analysis.

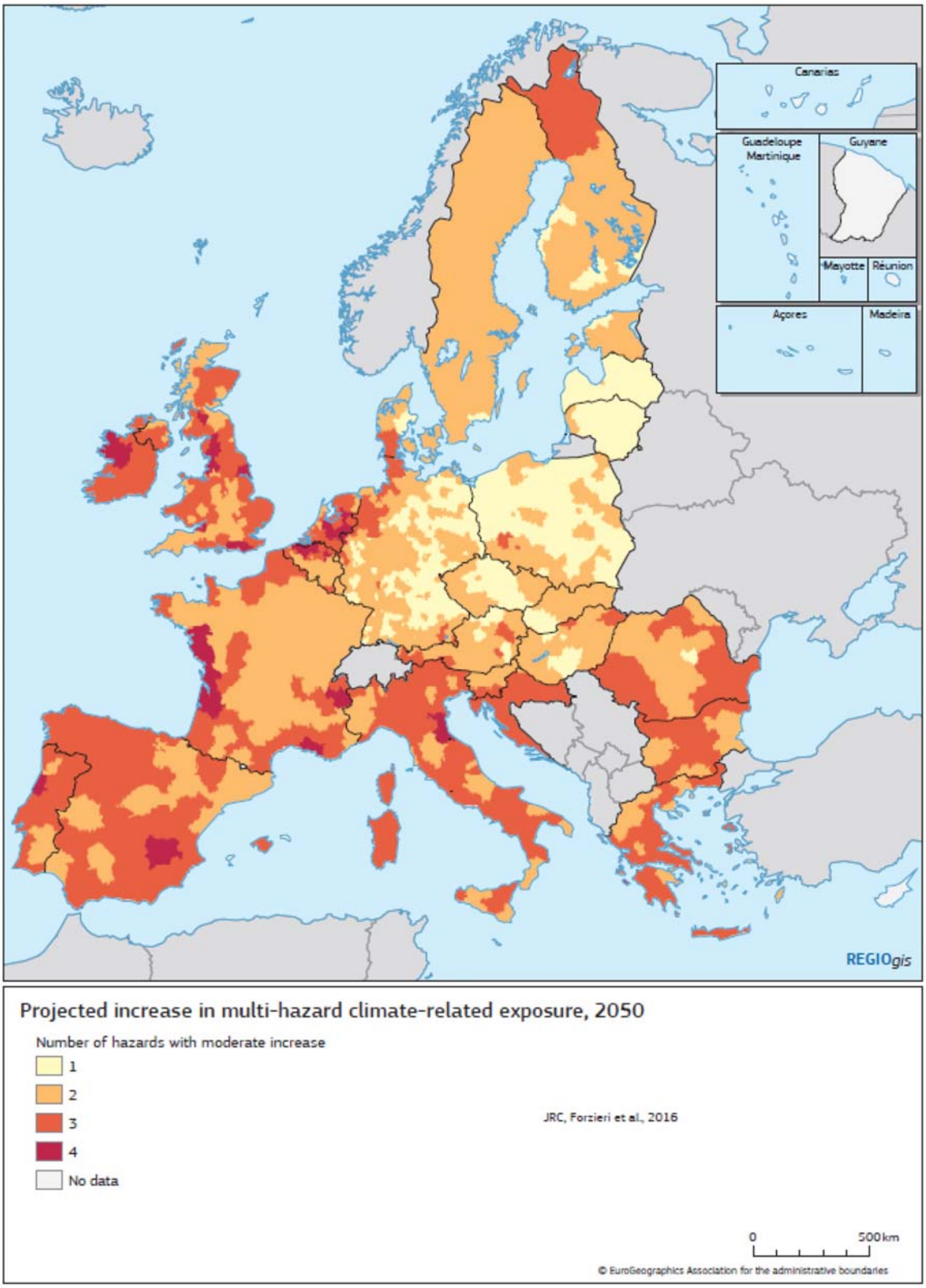
Map 3-2 Adverse climate change effects under a 2°C warming scenario



Climate change is also expected to increase the occurrence of natural hazards throughout the EU in the coming decades. Recent studies[12] show that places where the effects are likely to be particularly severe (i.e. affected by increase in the probability of hazard occurrences of at least 20% for three or even four of the 7 hazards considered) will progressively extend northwards to Central and Western Europe in the coming decades, covering, by 2050, many areas of the Netherlands, the UK and Ireland as well Spain, France, Italy, Bulgaria and Romania (Map 3-3).

[12] Forzieri, G., Feyen, L., Russo, S., Vousdoukas, M., Alfieri, L., Outten, S., Migliavacca, M., Bianchi, A., Rojas, R. and Cid, A. (2016), "Multi-hazard assessment in Europe under climate change", Climatic Change 137, 105–119 (doi: 10.1007/s10584-016-1661-x).

Map 3-3 Projected increase in multi-hazard exposure



Estimating the economic costs of climate change is particularly challenging, but most studies indicate that these costs could be high even for modest changes in climate[13]. The PESETA II study estimates total damages in the EU of up to EUR 190 billion by the end of the 21st century under a high economic growth scenario[14], mostly from heat-related deaths and losses in agriculture and coastal areas.

The costs are expected to be far from evenly distributed across Europe, and much higher in southern Europe than elsewhere (the CIRCE project estimates that Mediterranean countries could lose an average of just over 1% of GDP by 2050 notably from damage to tourism and energy)[15].

Outermost Regions and environmental challenges

The outermost regions are particularly vulnerable to climate change and natural disasters as was shown with the dramatic impact of the hurricane Irma on Saint Martin. Most of them are tropical or sub-tropical islands with a difficult topography and fragile economies and ecosystems. Climate change is also likely to impact on fauna and flora, with probable effects on some agricultural products on which their economies rely, notably sugar cane and bananas.

Being primarily concerned, the outermost regions have realised at an early stage the need to the fight against climate change. For example, the French Guiana forest is an important source of decarbonisation of the planet and its preservation helps to limit the rise in global temperatures.

The regions are also increasingly reducing the use of fossil fuels for electricity generation. The share of renewable energy in electricity production in French Guiana is already 64%. Martinique, Guadeloupe and Reunion Island have ambitious targets of 100% renewables penetration in electricity production by 2030 mainly through combined use of solar, hydro energies, wind, geothermal and the use of smart grids. Guadeloupe develops building regulations specifically adapted to local conditions.

Canary Islands plan to reach total energy and water self-sustainability of the island of El Hierro by upgrading the capacity of the existing hydro power plant with pumping, installing additional wind power capacity, using only electric vehicles in the island and making further use of locally produced biomass.

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13 Ciscar, J. C., Feyen, L., Soria, A., Lavalle, C., Raes, F., Perry, M., Nemry, F., Demirel, H., Rozsai, M., Dosio, A., Donatelli, M., Srivastava, A., Fumagalli, D., Niemeyer, S., Shrestha, S., Ciaian, P., Himics, M., Van Doorslaer, B., Barrios, S. (2014), *Climate impacts in Europe: The JRC PESETA II Project*, JRC Scientific and Policy Reports EUR 26586 EN, JRC87011, European Commission, Joint Research Centre, Seville.

14 In 2000, the Inter-governmental Panel on Climate Change (IPCC) published the Special Report on Emissions Scenarios (SRES) which describes greenhouse gas emission scenarios used to make projections of possible future climate change. The SRA1B scenario assumes rapid economic growth, a global population that reaches 9 billion in 2050 and then gradually declines, the quick spread of new and efficient technologies, a convergence of world income and way of life and extensive social and cultural interactions worldwide.

15 Navarra, A. and Tubiana, L. (2013), *Regional assessment of climate change in the Mediterranean, Advances in Global Change Research*, Springer Netherlands, Dordrecht.

3.3. STATE OF ENVIRONMENT

3.3.1. Water

One of the objectives of the Seventh Environment Action Programme (7th EAP) is to ensure the good status of transitional[16], coastal and fresh water by 2020. Surface water[17] is a major component of fresh water and improving its ecological state is critical to achieving this objective.

The Water Framework Directive[18] (WFD) and other water-related ones have contributed to improving water protection in the EU. In general, people throughout the EU can safely drink tap water and swim in many of the coastal areas, rivers and lakes. However, reducing pollution to meet the objectives of the WFD requires as a pre-condition that several other Directives and regulations are fully implemented[19].

Although progress in wastewater treatment and reductions in agricultural inputs of nitrogen and phosphorus have helped to improve the quality of surface water in the EU, pollution from agriculture (particularly nitrogen losses) as well as from urban and industrial wastewater remains significant. According to the EEA, in 2015, only 53% of water bodies are estimated to have good ecological status, making it unlikely that the objective of achieving good status of all water will be met by 2020[20].

Member States differ substantially in terms of the ecological status of their river basins (Map 3-4). In Belgium, northern Germany and the Netherlands, over 90% of surface water is reported to be in a 'less than good' ecological state. In the Czech Republic, southern England, northern France, southern Germany, Hungary and Poland, 70% to 90% of freshwater bodies (lakes and rivers) are reported to be in a similar state. The ecological status of coastal and transitional water is also poor in the Black Sea and greater North Sea regions. On the other hand, a much larger share of surface water is in good ecological state in Northern regions of Sweden and Finland and some regions of Northern Italy, Northern Spain, Latvia and Greece.

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16 Transitional waters are bodies of surface water in the vicinity of river mouths which are partly saline as a result of their proximity to coastal waters but which are substantially affected by freshwater flows.

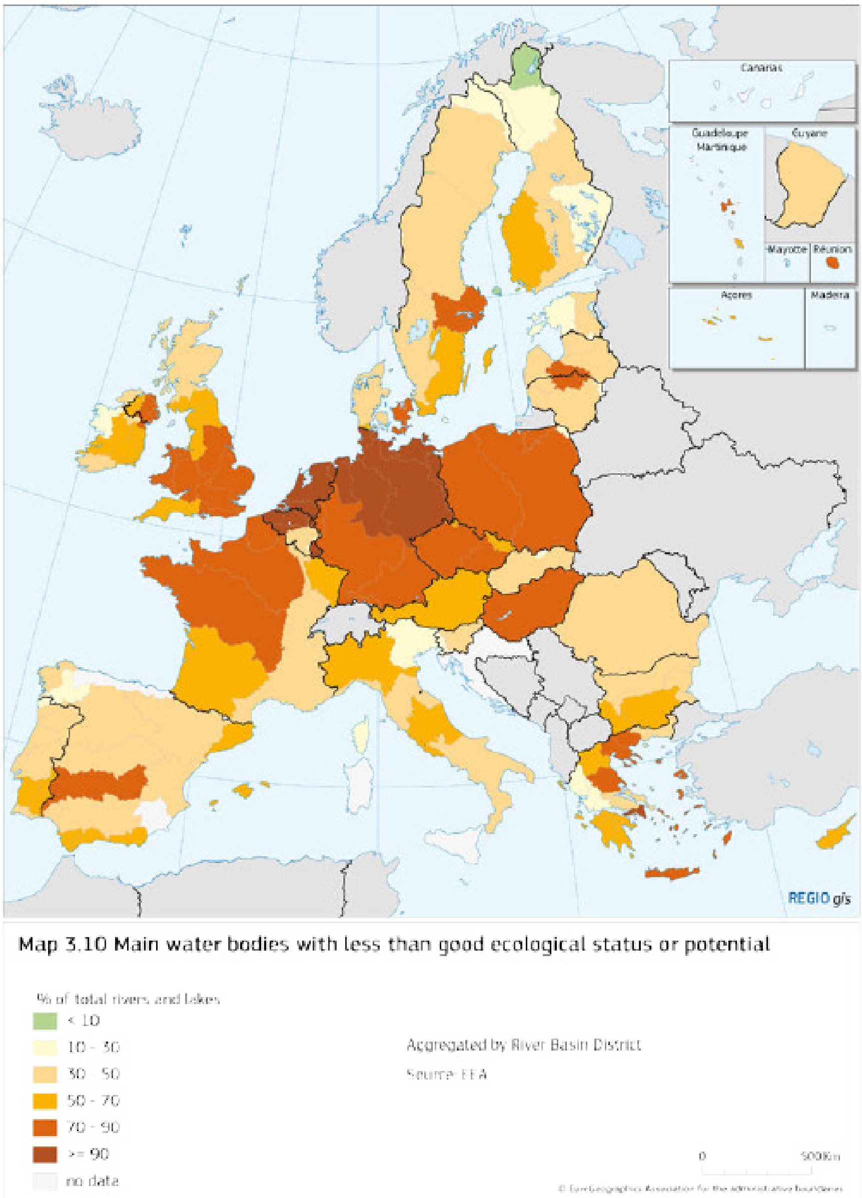
17 Surface water is water on the surface of the planet in rivers, lakes, wetlands and oceans, in contrast to groundwater and atmospheric water.

18 Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, OJ L 327, 22.12.2000.

19 This includes the Urban Waste Water Treatment Directive, the Nitrates Directive, the Directive on Sustainable Use of Pesticides and the Industrial Emissions Directive.

20 Note that the picture is similarly bleak for marine ecosystems. In their initial assessments for the Marine Strategy Framework Directive, Member States indicated that only 4% of marine species and habitats have a 'good environmental status', while 80% are categorised as 'unknown'. The indication is that marine resources are being used unsustainably and as a number of human off-shore and on-shore activities depend on the health, cleanliness and productivity of the seas, there is a need for them to be used responsibly.

Map 3-4 Main water bodies with less than good ecological status or potential



To achieve good status, Member States will have to do more to reduce the pressure on water bodies. This will require substantial investment in ways of reducing pollution or tackling over-abstraction of ground water and morphological and hydrological changes[21]. Such investment can be supported by cohesion policy (in the 2007-2013 programming period around EUR 17.8 billion of the ERDF and Cohesion Fund was allocated to wastewater infrastructure in 22 Member States[22]).

[21] River morphology corresponds to the shapes of river channels. It is determined by a number of processes and environmental conditions, including the composition and erodibility of the river bed and banks, vegetation and the rate of plant growth, the availability, size and composition of sediments and human interaction. River hydrology refers to the movement, distribution and quality of water.

[22] COM(2016) 105 final of 4.3.2016.

Appropriate collection and treatment of wastewater to remove organic matter, nutrients (nitrogen and phosphorus) and other hazardous substances it contains is essential for improving the ecological status of water bodies (marine and freshwaters) as well as to reduce the risk to human health and biodiversity.

The Urban Waste Water Treatment Directive[23] (UWWTD) sets minimum requirements in respect of urban wastewater treatment, making it mandatory for settlements with the equivalent to 2 000 inhabitants or more. Since its adoption in 1991, it has led to a considerable reduction in discharges of major pollutants but its implementation still needs to be improved in a number of Member States and regions.

The level of treatment required in the UWWTD depends on the sensitivity of the areas of discharge and on the size of the settlements. Sensitive areas are those where the environmental risks due to the adverse effects from wastewater discharge are particularly high (e.g. risk of eutrophication by excess of nutrients) or which require specific protection, such as drinking water abstraction areas and waters for bathing and those where shellfish live. Secondary (biological) treatment, which decomposes most of the organic matter responsible for the oxygen depletion, is the minimum requirement in 'normal' or non-sensitive areas. Tertiary (or more stringent) treatment, which removes nutrients and disinfects the water, is required in large settlements (with the equivalent of 10 000 inhabitants or more) discharging into sensitive areas.

According to the UWWTD 9th Reporting Exercise (2014), high compliance rates are generally observed in most EU-15' Member States, especially in Austria, Germany and the Netherlands, which have largely implemented the Directive. However, there are still a number of EU-15 countries which have compliance gaps and have delayed the implementation of necessary measures. This is notably the case for Italy, Spain, Belgium, Luxembourg and Ireland.

The picture is different for EU-12 Member States (i.e. excluding Croatia, for which the deadline for compliance is 2018). This is partly a result of their later accession and the transitional periods for compliance which have been granted to them. The last available results, however, show a substantial improvement in compliance with collection obligations compared to previous years. The compliance rate is generally high, except for Cyprus (61%), Slovenia (65%) and above all Bulgaria (26%) and Romania (3%). Some Romanian regions as well as several Bulgarian regions and Eastern Slovenia show compliance rates below 40%, and even below 20% as in the case of Romania and of south-western Bulgaria. This regional concentration of not compliant agglomeration has significant implication for the water quality of the affected river basins such as the Black Sea Basin.

The same applies to wastewater treatment. In the majority of EU-12 Member States, Secondary treatment of wastewater shows high compliance rates of above 85% for eight of the countries, the exceptions being Romania, Bulgaria, Malta and Slovenia which have much lower compliance rates. In some regions, like Principado de Asturias (ES), Sicilia (IT), Slovenia and most Bulgarian regions, the share of agglomerations where secondary treatment is not taking place is even below 40%. In these regions, human and ecosystem health is critically threatened due to the low degree of compliance.

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[23] Council Directive 91/271/EEC 21 May 1991 concerning urban waste water treatment, OJ L 135, 30.5.1991, p. 40.

Compliance rates are also high in most cases in respect of stringent treatment, where applicable, varying between 50% and 100%, except in Romania, Bulgaria and Malta, where there are substantial delays in implementing the necessary measures.

3.3.2. Waste

Solid waste affects human health as well as the environment since it generates emissions of polluting substances into the air, soil, surface water and groundwater. It also presents major challenges for management as the quantity of waste produced per person has increased steadily over time. A transition to a more circular economy requires action throughout a product’s life-cycle: from production to the creation of markets for waste-derived materials. Waste management is one of the main areas where further improvements are needed and which are within reach. Accordingly, reducing the generation of waste and promoting its reuse and recycling are key objectives of the EU action plan for the circular economy[24].

In 2014, an average of 4.9 tonnes of waste per person were generated in the EU. Much of this was produced by construction and demolition, mining, quarrying and manufacturing. Households also produced a substantial amount of waste, an average of 411 kg per person. Marine litter, escaping from waste management systems, is a growing concern. The total amount of waste generated (including mineral waste) in the EU increased by around 2% between 2010 and 2014 though there are wide variations between Member States.

Increasingly, waste is recycled or energy is recovered from it. Between 2010 and 2014, the proportion of treated waste (excluding mineral waste) recycled increased only slightly from 53% to 55%, while the proportion incinerated with energy recovery rose from 11% to 14%. The increase in recycling occurred against a background of measures designed to stimulate it, including EU and national legislation, support from the structural funds, landfill taxes and pay-as-you-throw schemes.

In 2014, the proportion of waste (excluding mineral waste) disposed of in landfill fell from 28% to 25% in the EU (Figure 3-4). There are, however, marked variations between Member States. Over 80% of waste is still landfilled in Bulgaria and Greece and over 50% in Estonia, Cyprus, Malta, Romania and Slovakia. By contrast, less than 5% goes to landfill in Belgium, Denmark and the Netherlands.

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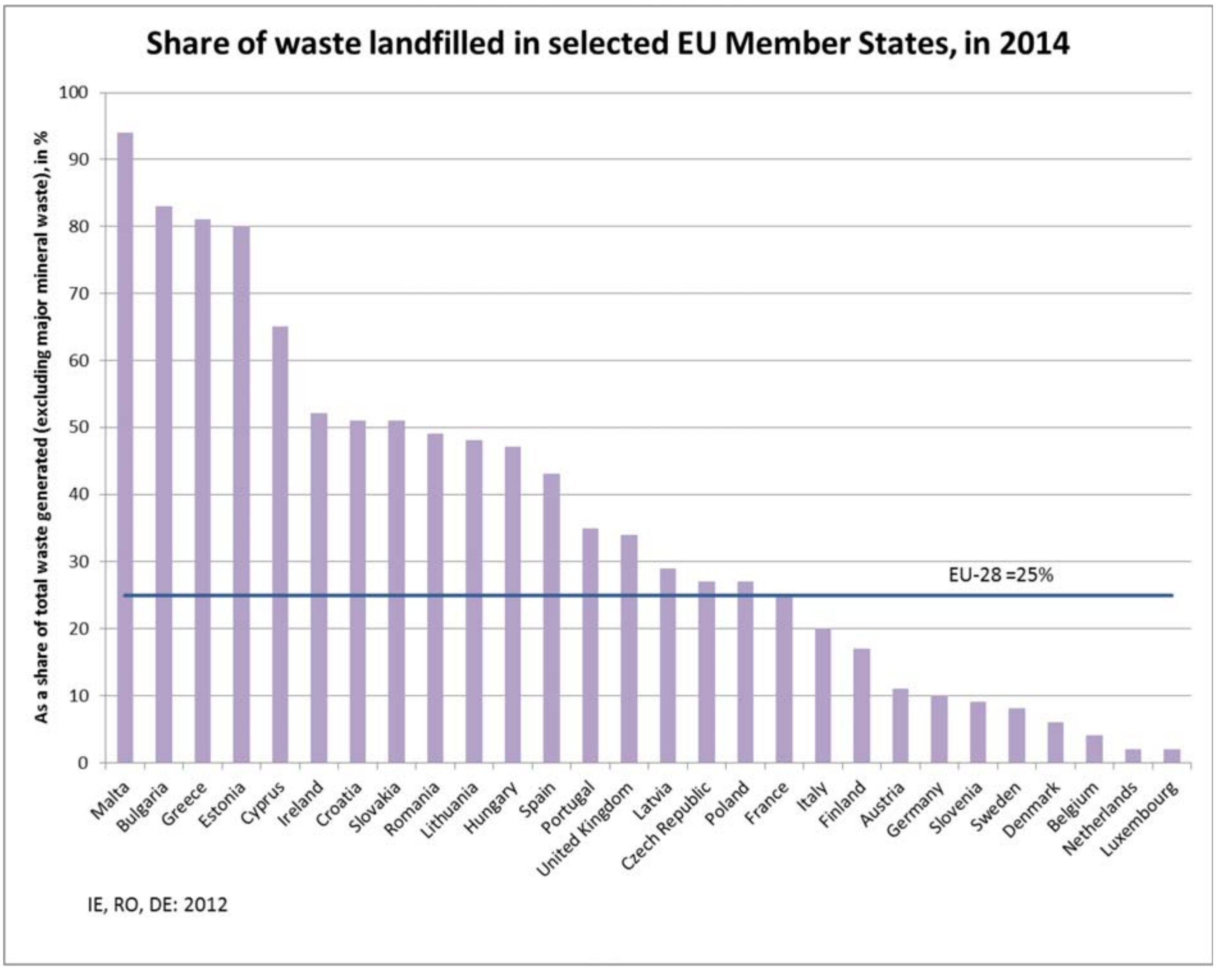
[24] European Commission 'Closing the loop - An EU action plan for the circular economy', COM(2015) 614 of 2.12.2015. A circular economy is one in which the value of products, materials and resources is maintained for as long as possible, minimising waste and resource use.

Figure 3-4 Share of waste landfilled in selected EU Member States, 2014



Circular economy

The EU action plan for the circular economy establishes a long-term approach to reducing waste generation, increasing recycling and reuse and reducing landfill and incineration. The circular economy is aimed at 'closing the loop' of product lifecycles by keeping resources within the economy so as to improve use of raw materials, products and waste. It contributes to meeting the EU's environmental and climate objectives and stimulates local and regional development. Waste prevention, eco-design and similar measures generate savings, increase turnover and create jobs, particularly in re-manufacturing, repair and product innovation. EU cohesion policy is important in making the circular economy a reality. In the 2014-2020 programmes, there is substantial funding for waste management as well as support for the circular economy through investment in innovation, SMEs, resource efficiency and renewables as well as green jobs.

3.3.3. Sustainable transport

Besides making transport more competitive and increasing the quality of the network, EU transport policy has also sought to reduce dependence on oil, greenhouse gas and other emissions (such as SO_x, NO_X and fine dust), to limit congestion and to improve safety.

Over the past 20 years, the volume of goods and number of passengers transported within the EU has grown steadily, apart from during the global recession in 2008-2009. Between 1995 and 2014, both passenger and freight transport increased on average by just over 1% a year[25]. Transport increasingly faces serious social and environmental challenges. It is second only to energy in greenhouse gas emissions, accounting for 23% of the total and, unlike energy, its emissions have raised since 1990 (by around 20%). Transport may also have significantly damaging effects on the quality of the environment, such as by increasing fragmentation of natural habitats.

The aim, therefore, is to establish a 'sustainable mobility' model of transport, to develop an efficient and competitive transport sector as a key element of the EU internal market while at the same time reducing costs from road accidents, respiratory diseases, climate change, noise, environmental damage and traffic congestion. The model entails fostering environmentally-friendly modes of transport as well as combined and inter-modal transport.

In its 2011 White Paper on the future of transport up to 2050, the Commission set the objective of reducing greenhouse gas emissions from transport by at least 60% in relation to 1990 levels by 2050. The interim aim is to reduce emissions by 20% in relation to 2008 levels by 2020-2030, requiring a fundamental shift towards the use of less and cleaner energy and more efficient utilisation of transport infrastructure. To achieve these objectives, the White Paper called for a shift of 30% of freight being transported over 300 km by road to rail or water by 2030 and one of over 50% by 2050, a tripling of the length of the existing high-speed rail network by 2030 and a move of the majority of medium-distance passenger travel to rail by 2050. It also targets the establishment of a fully functional multimodal TEN-T in the EU by 2030 and a high-quality and high-capacity network by 2050. In many places, achieving these objectives implies improving markedly the quality of transport infrastructure and new construction. Transport is the main beneficiary of the Connecting Europe Facility which has a budget of EUR 24 billion for the period up to 2020.

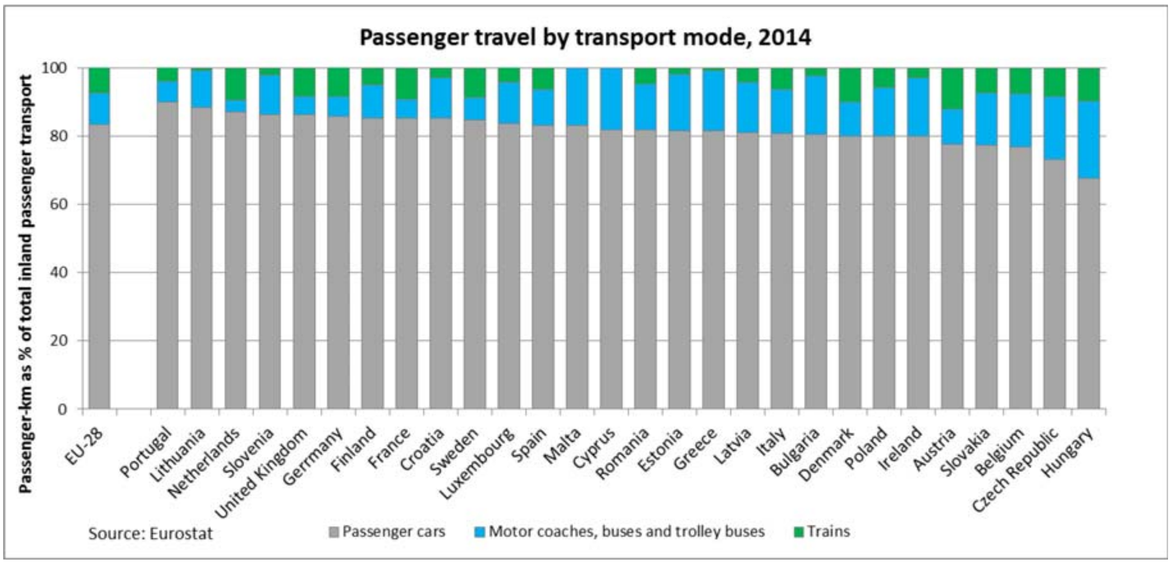
Cars remain by far the predominant mode of passenger transport in the EU. In 2014, they accounted for over 83% of all inland passenger km travelled in the Union[26], varying from 68% in Hungary to almost 90% in Portugal and Lithuania (Figure 3-5).

Buses accounted for 9% of passenger km travelled, the share varying from 3% in the Netherlands to 23% in Hungary. Trains accounted for 8%, though the figure varies according to the size and state of the rail network. In France, Austria and Sweden, which have fast and frequent trains, around 10% of travel was by rail, while in Greece, Estonia, Lithuania, where the rail network is limited and of low quality, the figure was less than 2%.

Figure 3-5 Passenger travel by transport mode, 2014

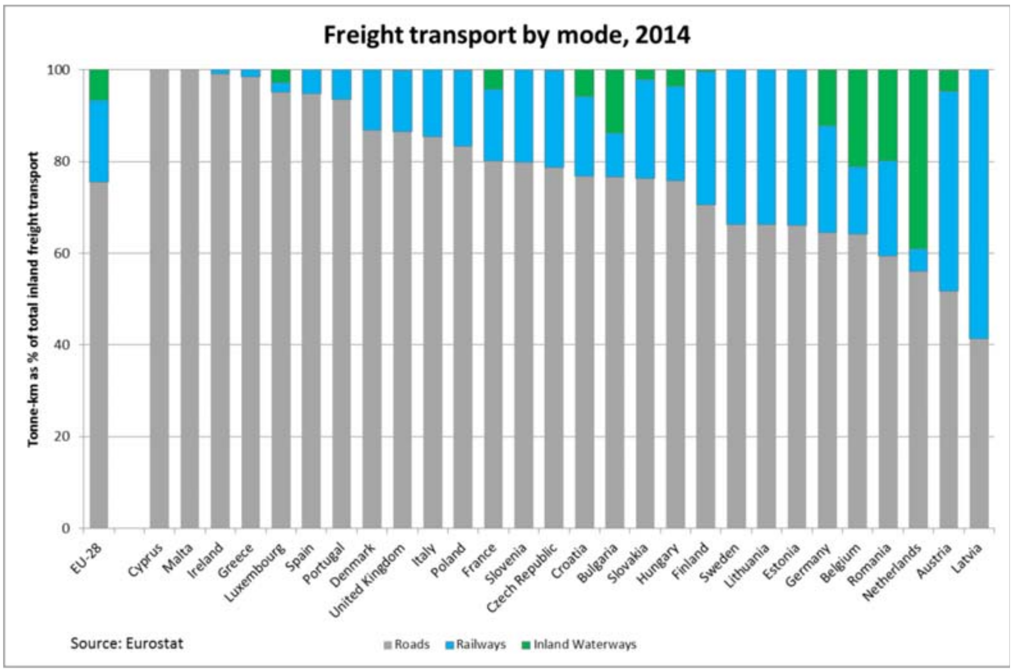
[25] European Commission (2016), *Statistical Pocket Book – EU Transport in Figures*, Luxembourg: Publications Office of the European Union, 2016 (https://ec.europa.eu/transport/facts-fundings/statistics/pocketbook-2016_en).

[26] Passenger-kilometre represents one passenger travelling a distance of one kilometre. The share is the percentage of transport by passenger cars in total inland passenger transport, measured in passenger-kilometres.



In the case of freight, around 75% of goods were transported by road in 2014 (Figure 3-6). In Cyprus, Malta, Ireland and Greece, all or almost all were. Only 18% on average went by rail, though in Austria, the proportion was 44% and in Latvia, 59%. In Romania, Belgium and the Netherlands, there is an extensive network of inland waterways and these carried around 20% of freight in the first two and almost 40% in the last.

Figure 3-6 Freight transport by mode, 2014



These figures have been remarkably stable over time both for passenger and freight transport, except in a few Member States, particularly Romania and Estonia, where the share of freight going by road increased by 10 and 18 percentage points, respectively, between 2011 and 2014. Significant effort is, therefore, needed to achieve a shift to more environmentally-friendly modes of transport.

3.4. Sustainable cities

3.4.1. Cities can be environment friendly

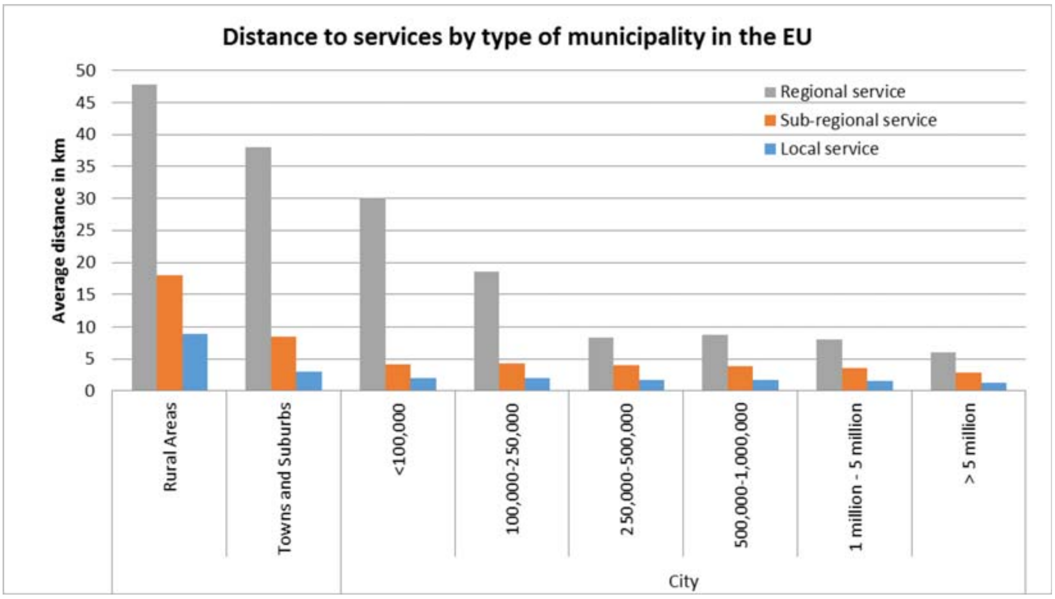
Cities are often considered to be inherently harmful for the environment. In practice however, cities are not just a source of pollution but also a potential solution to current environmental challenges. While urban areas in the EU generally face more environmental challenges than other places, they can often prove to be more resource and energy efficient than other areas where low-density settlements, energy-intensive buildings (e.g. detached houses) and the level of dependency on the car for transport are generally more common. Housing in cities tends not only to occupy less land but also more frequently takes the form of apartments and townhouses which generally require less energy to heat and cool.

Cities also offer more possibility adopting a low carbon lifestyle. Living in cities tends to make it possible to access a large number of services using less energy-consuming modes of transport. People generally prefer to be close to the services and facilities they regularly have need of, such as schools, healthcare services, childcare, cultural and sports facilities and shops. The average distance to such services is usually much less for people living in cities than in towns and suburbs or rural areas.

On average in the EU, the distance to access services by road is 4.5 times greater in rural areas (almost 9 km) than in cities (less than 2 km). In countries which are more urbanised, the difference is smaller, as in Malta (1.4 times greater in rural areas), the Netherland (2.3 times), Belgium (2.9 times) and the UK (2.8 times). In countries where urban areas are more dispersed, the difference can be much larger (at the extreme, in Finland, it is 13 times greater).

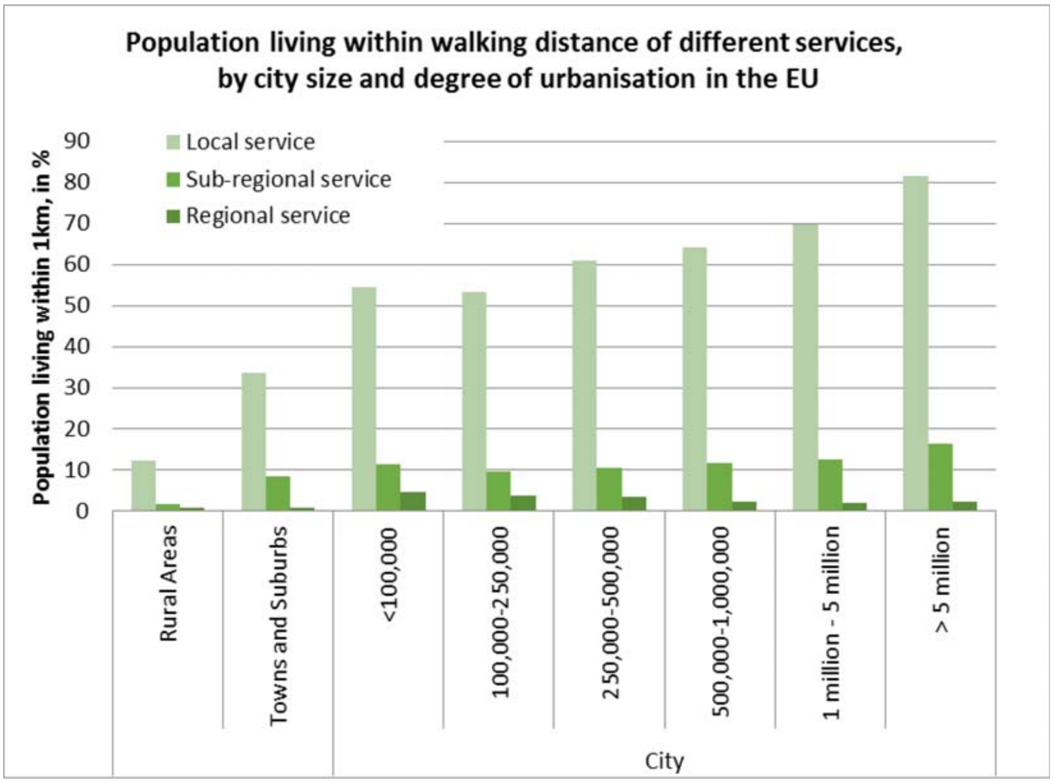
The difference between cities and other areas in terms of accessing services varies according to the service concerned. Local services (such as schools, general health services, childcare, sports facilities and shops) are generally available in all types of municipality, even though they take longer to reach in rural and suburban areas (Figure 3-7). The difference is greater for 'sub-regional' services, such as high schools, hospitals, theatres, cultural facilities and supermarkets, and greatest of all for regional services, such as specialised education and healthcare centres, large sports and cultural facilities or government offices. The average distance to reach such services in the EU is 48 km in rural areas, 38 km in towns and suburbs and less than 10 km in cities with a population of more than 250,000.

Figure 3-7 Distance to services by type of municipality in the EU



Accordingly, large cities offer the possibility of accessing services by walking or by bicycle while in rural areas or in smaller towns, it is much more difficult, or impossible, to do so. For instance, the average share of population in the EU living within 1 km of local services increases rapidly with the degree of urbanisation and the size of city, rising from 12% in rural areas to over 80% in cities of more than 5 million inhabitants (Figure 3-8)

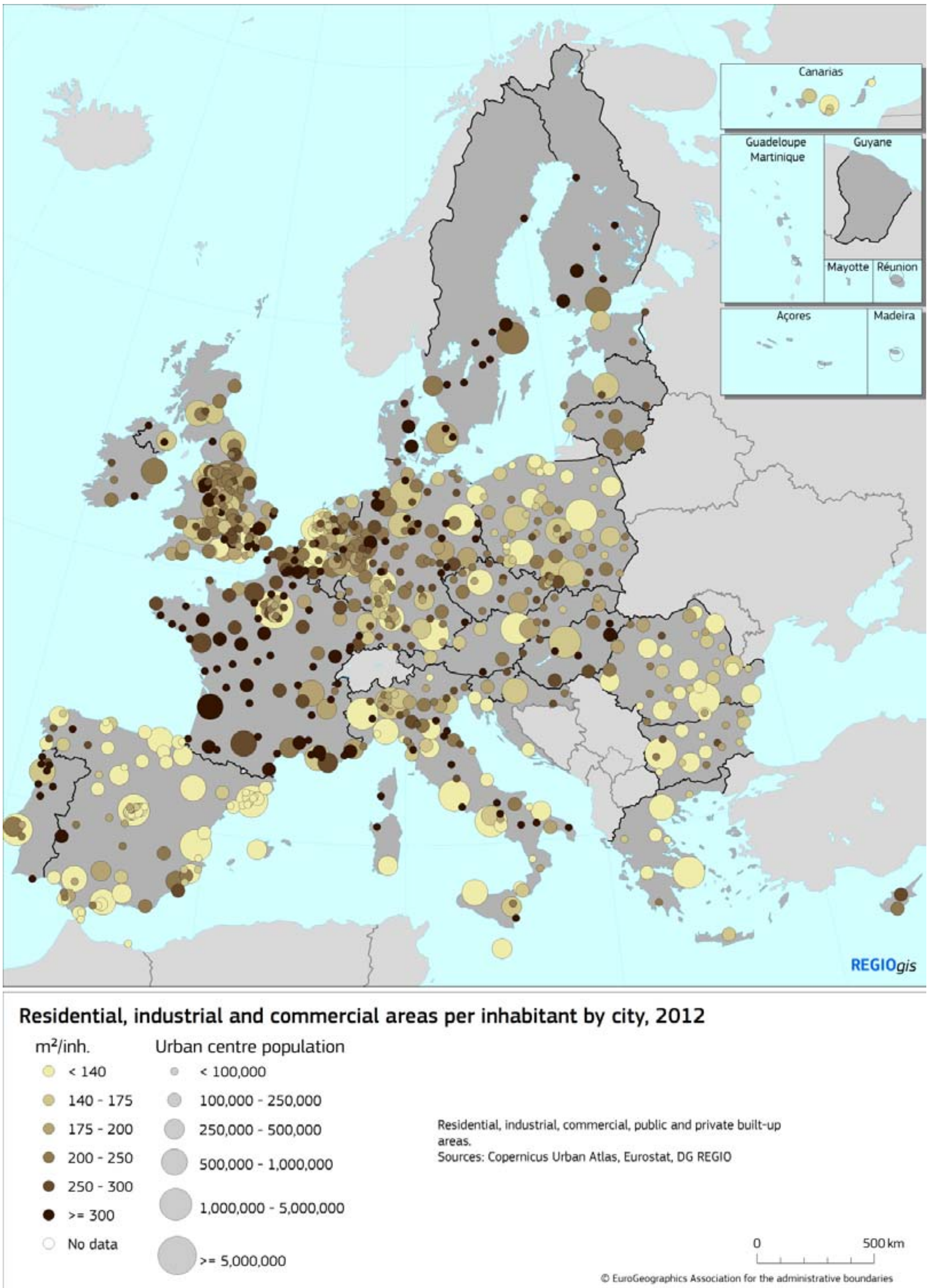
Figure 3-8 Population living within 1km distance of different services, by city size and degree of urbanisation in the EU



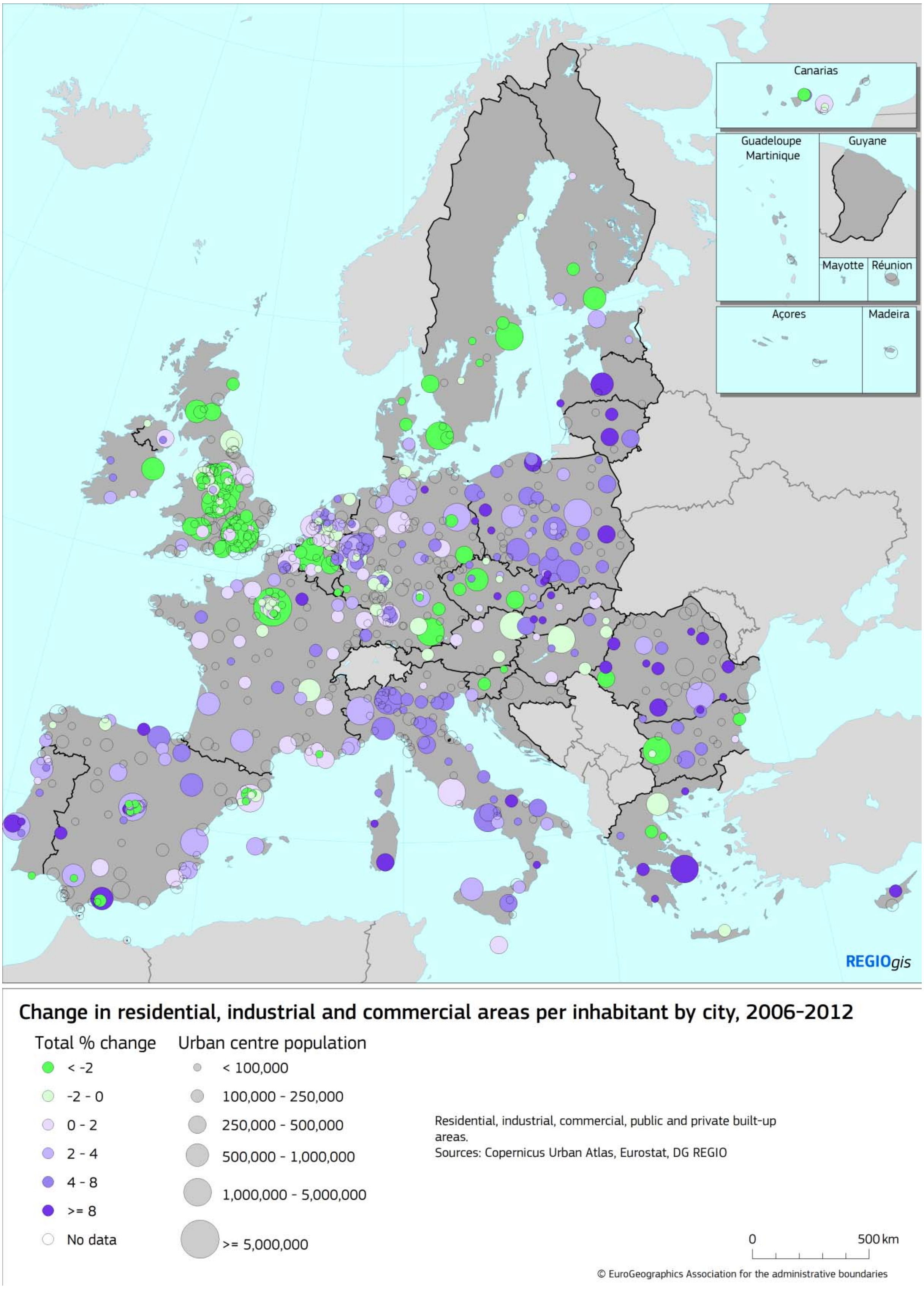
Cities also tend to be more efficient in their use of land. Built-up areas per person in cities are only a quarter of those in rural areas. This reflects the fact that the availability of land and its cost make cities more attractive for less land-intensive activities, such as services, company headquarters or leisure facilities, than suburbs or rural areas. Land scarcity also increases the incentive to economise on land use for housing, which is generally smaller in cities than in other areas where the average area occupied per household tends to be much larger.

Although land use per inhabitant is usually greater in large cities than in smaller ones, there are wide variations across the EU. In particular, cities in Northern and Western Europe are often more densely populated than in southern and central-eastern EU countries and the built-up area per inhabitant, therefore, tends to be smaller (Map 3-6). This difference tends to increase over time. Between 2006 and 2012, the built-up area per inhabitant increased most in cities in the southern and central-eastern EU while it declined in a number of large cities in northern and western Europe (Map 3-7).

Map 3-6 Residential, industrial and commercial areas per inhabitant by city, 2012



Map 3-7 Change in residential, industrial and commercial areas per inhabitant by city, 2006-2012



3.4.2. Changes in land use per person

The process of urbanisation is driven by a range of factors that can be influenced by various types of policy, including cohesion policy. According to a recent study[27], land use per person in the EU increased steadily from 0.94 of a hectare per 100 people in 1975 to 1.3 hectares in 2010. The overall increase in land use per person is consistent with an 'urban sprawl' phenomenon, or the rapid, and sometimes uncontrolled, expansion of built-up areas around towns and cities, creating widespread and relatively low density urban suburbs, often inefficient in terms of energy and land consumption[28].

The observed increase in land use per person, however, seems to be running out of steam as urban areas in many EU regions have become more densely populated over more recent years. The main increase in land use per person occurred over the period 1975-1990. In the period 2000-2010, despite a continuing slight increase at EU level, many regions experienced decreases.

The main developments in land use per person in different types of EU region are as follows:

- Metro and capital city regions: a NUTS 3 region which is a metropolitan area or part of one is more likely to experience increases in population density, and even more so if it contains the national capital city.
- Rural regions: a rural NUTS 3 region is likely to experience a decline in population density, which means that built-up areas are expanding at a faster pace than population.
- Increases in population, GDP per head, employment and accessibility are all positively associated with growth of population density. In general, socio-economic factors are major determinants of a region's attractiveness.
- Regions with a high Percentage of Available Land (PAL) have few or no physical constraints on development which discourages growth of population density. Pressure on land prices is likely to be low and so extensive land development is relatively inexpensive. Conversely, regions with limited space for development tend to experience upward pressure on land prices, leading to denser urban development.
- Places with high initial levels of population density generally experience lower growth of density, suggesting that further densification may be discouraged in such regions. This could be because of two possible complementary reasons: a concern to avoid or reduce the diseconomies resulting from densification and technical or legal constraints on population growth.

3.4.3. Urban transport

Public transport is equally more accessible in large cities. In the vast majority of large cities, the share of the population with high or very high access to public transport is above 60%,

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27 Batista e Silva F, Alvarez M, Vizcaino P, Jacobs Crisioni C, Ghisetti C, Pontarollo N, Lavalle C, D'Hombres B (2017) Determinants of urban land densification in Europe (forthcoming).

28 See for instance Jaeger J., Bertiller R, Schwick C. and Kienast F., (2010) "Suitability criteria for measures of urban sprawl", Ecological Indicators 10(2): 427–441.

and up to 98% in Madrid (Figure 3-9 which shows the situation in a sample of large cities)[29]. The only exception is Dublin where the figure is only 38%. The figures tend to be slightly lower for mid-size cities. The proportion of inhabitants with high or very high access to public transport is less than 50% in Toulouse and Vilnius but close to 90% or more in Bologna, Sevilla and Edinburgh (Figure 3-10).

Figure 3-9 Access to public transport in large European cities, 2014-2016

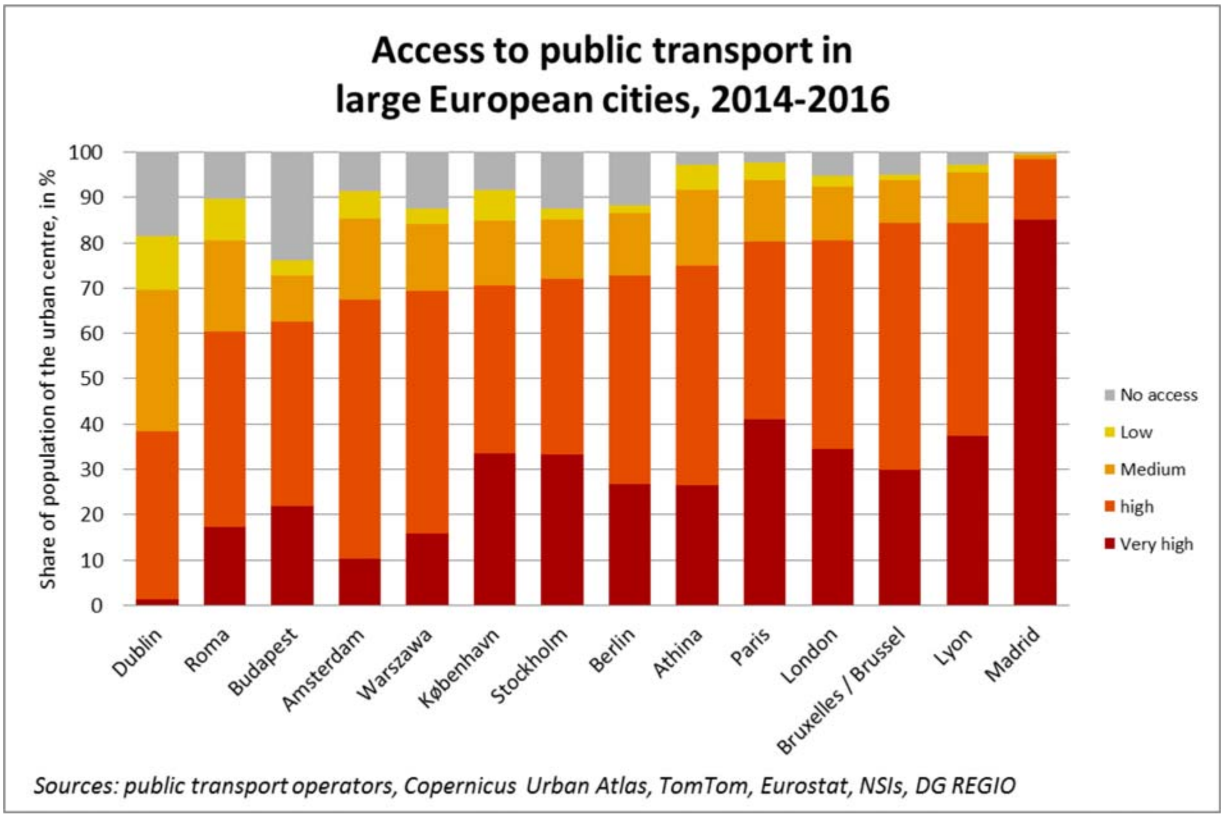
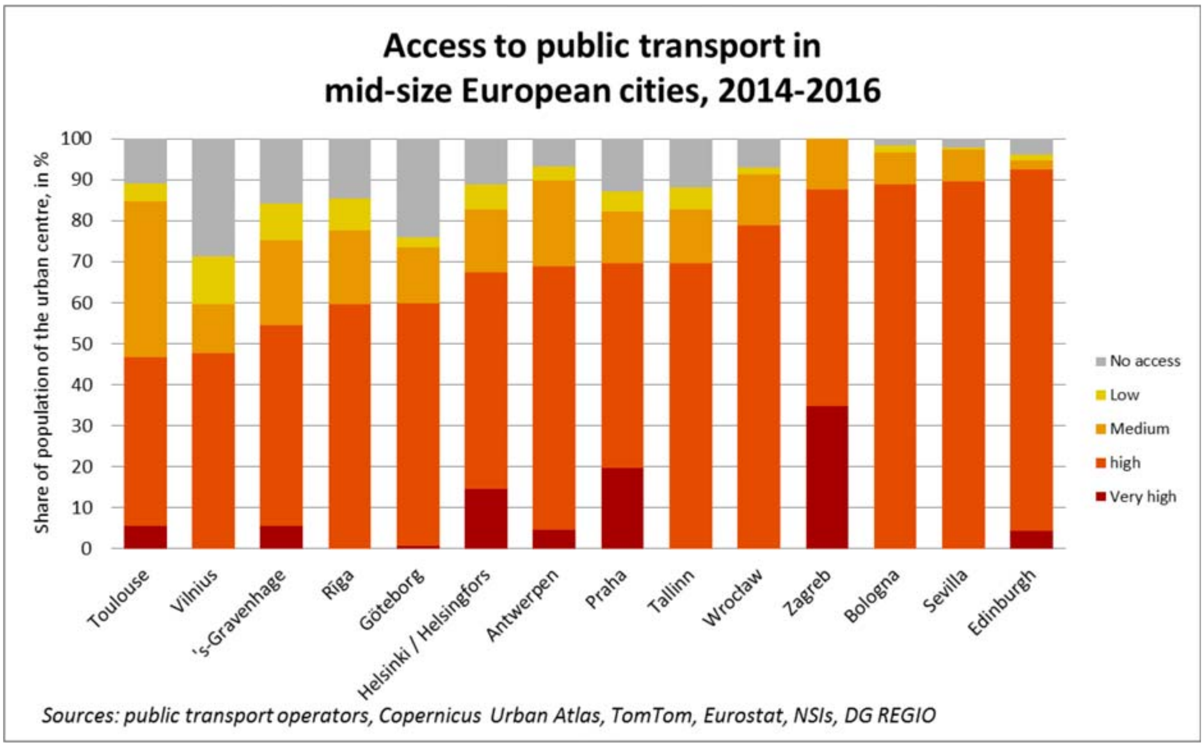


Figure 3-10 Access to public transport in mid-size European cities, 2014-2016

29 No access: it takes more than 5 minutes to walk to a bus or tram stop and over 10 minutes to reach a metro or train station; Low access: it takes less than this to walk to a public transport stop – i.e. people can easily walk there – with less than four departures an hour; Medium access: it people can easily walk to a public transport stop with between 4 and ten departures an hour; High access: people can easily walk to a bus or tram stop with more than 10 departures an hour OR people can easily walk to a metro or train station with more than 10 departures an hour (but not both); Very high access: people can easily walk to a bus or tram stop with more than 10 departures an hour AND a metro or train station with more than 10 departures an hour. See Dijkstra, L. and Poelman, H. (2015), "Measuring access to public transport in European cities", Regional Working Papers N° 01/2015.

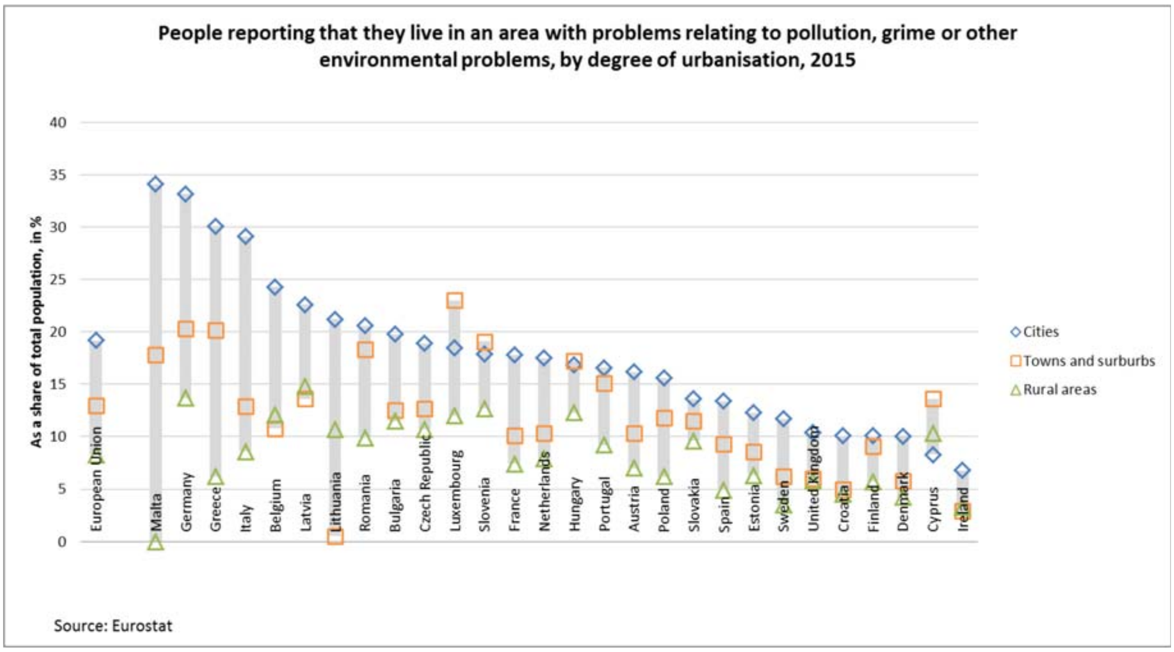


3.4.4. People living in cities suffer more from pollution

In 2015, the proportion of people in cities in the EU reporting to live in an area with environmental problems (19%) was larger than for those in towns and suburbs (13%) and rural areas (8%) (Figure 3-11). The proportion for those in cities was particularly large in Malta (34%), Germany (33%) and Greece (30%), while it was only around 10% or less in Ireland, Cyprus, Denmark, Croatia and Finland, where environmental problems seem less common[30].

[30] Note that these figures relate to perceived problems which might differ from actual problems as a result of differences in expectations about the state of the environment.

Figure 3-11 People reporting that they live in an area with problems relating to pollution, grime or other environmental problems, by degree of urbanisation, 2015



Air pollution remains a major environmental concern in the EU. Nine out of 10 people in urban areas in the EU are exposed to pollution concentrations above the levels recommended by the World Health Organisation (WHO). Air pollution has a major impact on human health, with an estimated 400 000 premature deaths each year due to high levels of fine particles and ozone. It also has a significant effect on ecosystems. Excessive nitrogen deposits (eutrophication) and ozone concentrations adversely affect biodiversity and crop yields and cause other material damage in over half of the EU.

At the same time, emission of air pollutants, notably of carbon monoxide, sulphur oxides and lead, has declined markedly in the EU over the years, partly as a result of EU legislation[31]. The application of European standards has also been successful in reducing vehicle emissions (such as after the introduction of the diesel particle filter), and the progressive renewal of the vehicle fleet means that air quality in the EU is likely to improve over the long-term. However, more needs to be done to address the issue, such as introducing regional or local incentives to favour very low pollutant emitting vehicles or even zero emission ones.

Some areas are still far from complying with agreed EU air quality standards[32]. This is notably the case in cities, where the majority of the EU population lives and where levels of

[31] Directive 2010/75/EU on industrial emissions, Directive (EU) 2015/2193 on medium combustion plants, Directive (EU) 2016/2284 on national emission ceilings and Directive 2008/50/EC on ambient air quality.

[32] Directive 2008/50/EC on ambient air quality and cleaner air for Europe fixes air quality standards, with a limit of 40 µg/m³ for the annual mean concentration of nitrogen dioxide. For fine particles, the limit is not more than 35 days per year with a daily average concentration exceeding 50 µg/m³ and a mean annual concentration not exceeding 40 µg/m³. For ozone, the limit is a daily 8-hour mean concentration not exceeding 120µg/m³ on more than 25 days per year.

sulphur dioxide, nitrogen oxides (NO_2), volatile organic compounds, ammonia, fine particulate matter ($PM_{2.5}$ and PM_{10}[33]) and ground level ozone (O_3) remain high.

Air pollution is severe in a number of cities in southern and central Poland, the Czech Republic, Romania and Bulgaria (Map 3-8) but also in Southern Europe (Po Valley, Naples, Cyprus and Greece). According to the EEA, in 2014 around 17% of the urban population in the EU was exposed to PM_{10} levels above the daily limit and 9% to $PM_{2.5}$ levels above the EU target[34].

To a large extent, concentration of airborne particulate matter is caused by emissions from diesel engines or from coal mining and other heavy industry. It is also affected by atmospheric conditions, pollution levels rising with sunshine and hot temperatures. These factors explain the geographical distribution of high PM concentrations. In 2013, for example, the average concentration rose above 40 µg per cubic metre in 9 cities in Bulgaria (including Sofia), peaking at 62.2 per cubic metre in Plovdiv, the second city[35]. The Czech cities of Havírov, Karviná and Ostrava in the coal mining region of Moravia-Silesia also recorded very high concentrations of PM. At the other end of the spectrum, most cities with relatively low levels of air pollution are located in the Nordic and the Baltic Member States.

Concentration of ground-level ozone can cause breathing and cardiovascular problems, asthma and lung disease. High concentrations occur mostly in cities in Northern Italy, Spain (e.g. Jaén and Toledo), the East and South of France (e.g. Sophia-Antipolis, Martigues, Mulhouse, Colmar and Aix-en-Provence) and Southern Germany (e.g. Freiburg im Breisgau, Karlsruhe, Hanau, Friedrichshafen and Heidelberg) (Map 3-9). Around 15% of the urban population in the EU lives in areas in which the EU O_3 target threshold for protecting human health was exceeded in 2013[36].

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33 Particulate matter (PM) are microscopic solid or liquid matter suspended in the atmosphere. Subtypes of atmospheric particulate matter include respirable particles with a diameter between 2.5 and 10 micrometres (µm).

34 European Environment Agency (2015), *Air quality in Europe — 2015 report*, Report No 5/2015. http://www.eea.europa.eu/publications/air-quality-in-europe-2015.

35 EUROSTAT (2016), *Urban Europe, Statistics on cities, towns and suburbs, Edition 2016*, Publications office of the European Union, Luxemburg.

36 European Environment Agency (2015), *Air quality in Europe — 2015 report*, Report No 5/2015. http://www.eea.europa.eu/publications/air-quality-in-europe-2015.