

THE EUROPEAN ENVIRONMENT
STATE AND OUTLOOK 2015

CROSS-COUNTRY COMPARISONS

European Environment Agency

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SOER 2015 cross-country comparisons analyse selected environmental issues across a number of EEA countries. They are part of the EEA's report SOER 2015, addressing the state of, trends in and prospects for the environment in Europe. The EEA's task is to provide timely, targeted, relevant and reliable information on Europe's environment.
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Agriculture — organic farming

Reducing agriculture's environmental impacts requires a transition towards innovative, low-input systems. Organic production plays a role in increasing the efficiency of nutrient management and reducing pesticide use.

While there has been rapid development in recent years, in 2012 the total area under organic farming was still only 5.7% of total utilised agricultural area, with more than a 60-fold difference in the share of organic farming amongst countries.

Setting the scene

Agricultural production covers roughly half of Europe's land territory and is fundamental to food security. It is multifunctional, providing food, fibre and feed and playing a very important socio-economic role, particularly in rural communities. Europe has a high diversity of farming practices, growing conditions and agricultural ecosystems. Agriculture has substantial positive and negative impacts on soils, air and water quality, ecosystems and biodiversity, and landscape amenity value.

The SOER 2015 briefing on agriculture provides an overview of the status, trends and prospects of agriculture in Europe and its effect on the environment. This SOER 2015 cross-country comparison focuses on organic farming.

Organic farming aims to be a more environmentally sustainable form of agricultural production, combining best environmental practices, and emphasising biodiversity protection and the preservation of natural resources. It also emphasises high animal welfare standards and the avoidance of synthetic chemical inputs such as fertilisers and pesticides and genetically modified organisms (GMOs).

About the indicator

The indicator is defined as the share of total utilised agricultural area (UAA) occupied by organic farming (existing organically-farmed areas and areas in the process of conversion). Farming is only considered to be organic at the European Union (EU) level if it complies with Council Regulation (EC) No 834/2007, which provides a comprehensive framework for production of crops and livestock; labelling, processing and marketing of organic products; and the import of organic products into the EU.

This indicator is regularly published by Eurostat and provides information on the degree to which adoption of organic farming practices has been occurring in European countries. This indicator is also included in the Resource Efficiency Scoreboard for the assessment of progress towards the objectives and targets of the Europe 2020 flagship initiative on resource efficiency.

Policies, targets and progress

European agriculture has been supported for over 50 years under the Common Agricultural Policy (CAP), and while there are no policy targets for organic farming at European level, the recently adopted Action Plan[1] and legislative proposal[2] set out objectives for the development of organic production to 2020. The positive effects of organic farming on the environment will contribute to achieving a range of European[3] and national policy objectives.

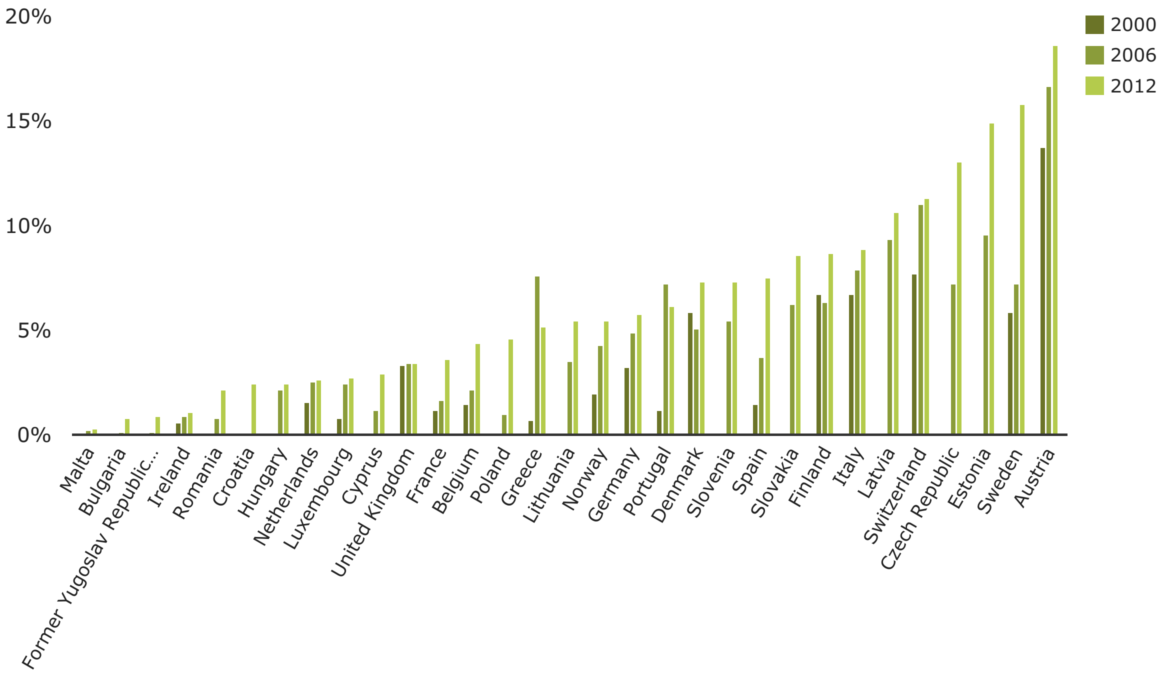
Many countries have adopted national policies for organic farming, with some containing quantitative targets such as increasing the percentage of land area under organic production, the number of organic producers, and the range of organic food products in public canteens.

While there has been rapid development of the organic sector in Europe in recent years, with an increase of around 500 000 hectares per year during the last decade,[4] in 2012 the total area under organic agriculture in the EU-28 was only 5.7% of the total UAA in Europe.[5] Most organic farmland is in countries that joined the EU before 2004 in which national and EU legislation have contributed to the development of the sector.

In absolute terms, the countries with the largest areas under organic production are Spain, Italy and France. However, the organic sector is quickly expanding in those countries that have joined the EU since 2004. These countries registered a 13% yearly growth rate in their organically farmed area from 2002 to 2011 and saw their number of holdings increase almost tenfold between 2003 and 2010.[4]

The relative share of organic farming within the total UAA gives an indication of the relative importance of the sector at national level. In 2012, the countries with the highest share of organic agriculture were Austria (18.6%), Sweden (15.8%) and Estonia (14.9%), and those with the lowest share were Malta (0.3%), Bulgaria (0.8%) and the former Yugoslav Republic of Macedonia (0.9%) (Figure 1).

Figure 1: Total organic crop area as a share of total utilised agricultural area in 31 European countries (2000, 2006 and 2012)



Note: Due to lack of data: Greece, 2011 instead of 2012; Cyprus, 2011 instead of 2012; Norway, 2009 instead of 2012.

Data sources: a. Eurostat. Certified organic crop area by crops products b. FOEN. Indicator on organic farming
c. EEA – Indicator SEBI020

There is more than a 60-fold difference in the share of organic agriculture amongst countries, arising from a range of natural as well as historical, political, social, economic and environmental factors. Environmental factors include climate, which influences the incidence of pests and therefore the need for pesticides, along with the annual growing conditions and type of crops cultivated and livestock reared.

Historical developments explain part of the variation. For example, in Austria, the country with the highest share of organic agriculture, organic farming has a long history, with the first farms being established in the 1920s. Austria was one of the first countries worldwide to set official guidelines and it has a national policy framework and action plan for organic food and farming. In Bulgaria, a country with one of the lowest shares of organic agriculture, the first intensive activities to develop organic farming began in the 1990s with development of the local market for organic produce and adoption of a national action plan in the mid-2000s.

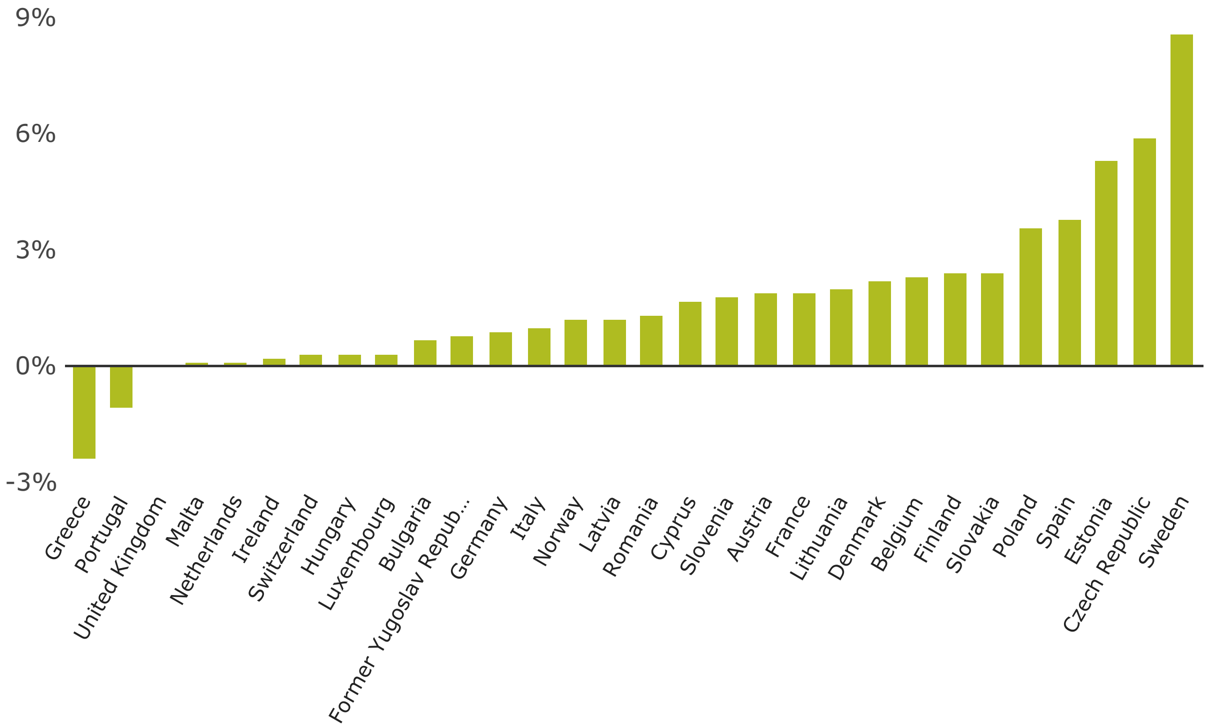
Organic agriculture in the West Balkans

Comparable time series data were not available for West Balkan countries, with the exception of the former Yugoslav Republic of Macedonia. The share of organic farming in the West Balkan countries is very low, but increasing. Between 2006 and 2009 the share of total agricultural land utilised for this purpose in the region as a whole increased from 0.09% to 0.32%. Albania experienced the most rapid increase in the same period, reaching almost 2% in 2009.

The organic farming sector is currently under development in all countries, and new strategies and policies are being prepared or are under preparation. The 2009 figure could be compared with the approximately 0.5% share of organic farming in the EU-10 Member States at the end of the 1990s.[6]

There is large variation amongst countries in the growth of organic production. It has grown in the majority of countries, with Sweden, Czech Republic and Estonia showing the largest growth between 2006 and 2012. Only Portugal and Greece showed a reduction in share in the same period, with the United Kingdom showing no change (Figure 2).

Figure 2: Percentage change in the share of organic agriculture from 2006-2012 in 30 European countries



Data sources: a. Eurostat. Certified organic crop area by crops products
b. Areas under organic agricultural production as % of cultivable area and total agricultural area, p4
c. FOEN. Indicator on organic farming d. EEA – Indicator SEBI020

Prospects

Organic farming has been identified as a key element in sustainable management of Europe's natural land-based resources.[2] A transition towards innovative low-input systems, such as organic farming, integrated farming, precision farming, conservation agriculture and silvopastoralism (a combination of forestry and livestock grazing) can contribute to meeting the challenge of having a more sustainable food system.[7]

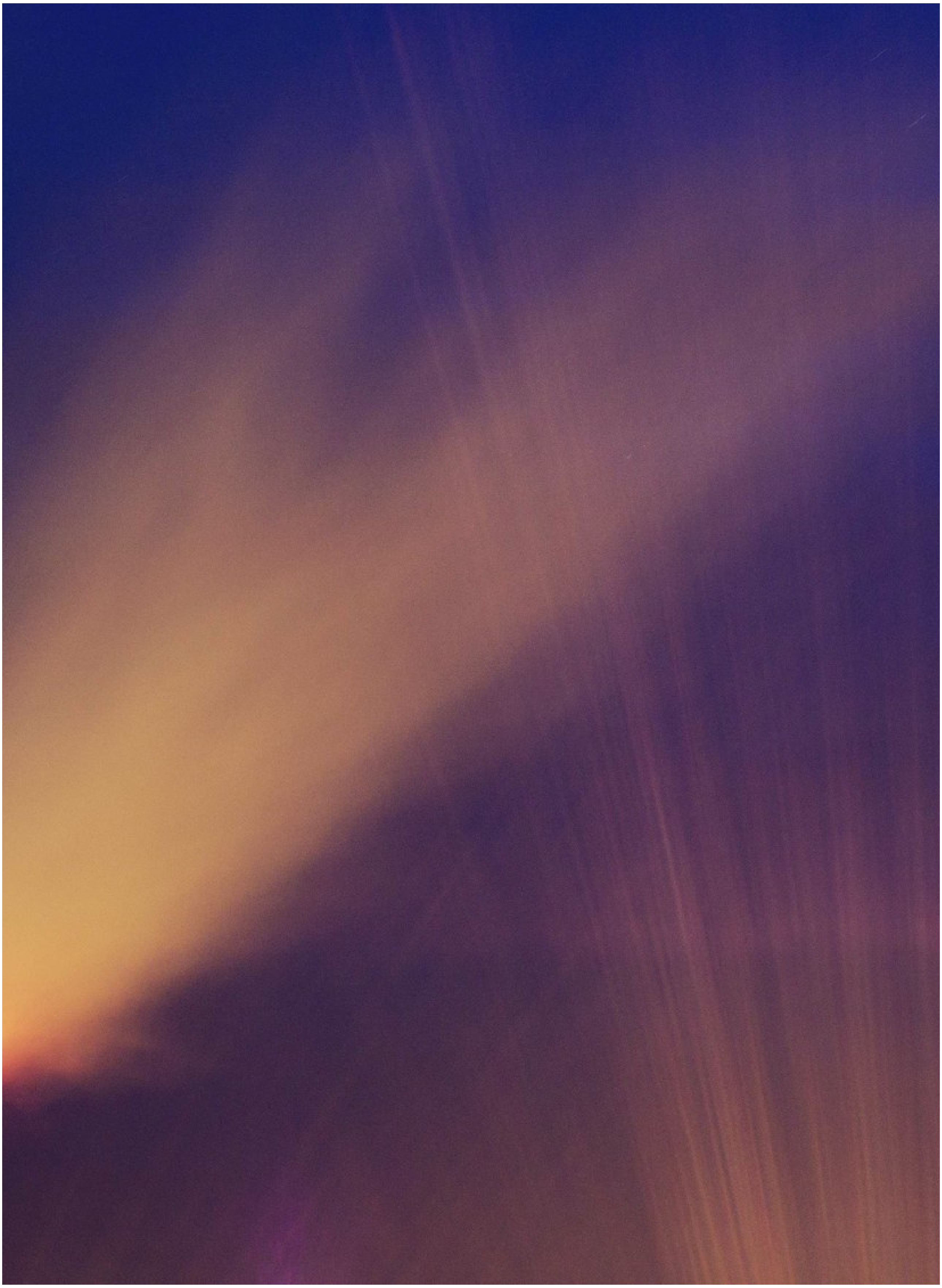
As well as a growth in the share of organic farming in most countries, there has also been a growth in the number of low-input farms in Europe, with such farms making up a higher percentage of area than high-input farms, although the latest available data are from 2007.[8][9]

The diversity of European agriculture and high number of countries that have adopted national action plans illustrate the potential for further growth in organic farming. This would contribute to increased efficiency in terms of nutrient management, reduce pesticide use, and reduce agriculture's impact on the environment and on biodiversity. The growing global demand for food, animal feed, fibre and bioenergy has implications for agriculture in European countries. A major challenge for organic farming is to expand and respond to demand without putting at risk consumers' confidence in the principles of organic farming and in the quality of organic products.[1]

At a European level, the Action Plan aims to respond to these challenges and focuses on the priority areas of increasing the competitiveness of organic producers; consolidating and increasing consumer confidence; and reinforcing the external dimension of the EU organic production scheme. Particular attention should be paid to the synergies between policies and instruments, in particular the reformed CAP. It recommends that countries use opportunities and tools available in the new legal framework for rural development[10] and the Common Fisheries Policy to support organic farming along with further use of public procurement requirements.

The CAP concerning the period 2014–2020, recognises organic farmers as 'green by definition' as they are automatically entitled to the green payment.[1] It enables specific agri-environment measures aimed at climate change mitigation and biodiversity conservation as well as organic farming practices to qualify for financial support from the rural development pillar (Pillar 2).

While these CAP greening measures are a step in the right direction, they do not seem to sufficiently address the resource efficiency of agriculture in terms of productivity, water use, carbon capture, and external inputs such as nutrients and pesticides. Nor do they sufficiently address the issue of ecosystem resilience.[7]



Cross-country comparisons

Air pollution — emissions of selected pollutants

Emissions of NO_X, SO_X, NH_3 and NMVOC have decreased significantly in most countries between 1990 and 2012. However, air pollution still causes significant harm to health and the environment in Europe.

The majority of countries are making progress towards meeting their 2020 targets under the 2012 revised Gothenburg Protocol. As a result, air quality in Europe is slowly improving.

Setting the scene

Almost all economic and societal activities result in emissions of air pollutants, the effects of which result in real losses for the European economy, the productivity of its workforce, and the health of its natural systems. Europe's air quality has improved considerably in the last 60 years but has not yet attained the air quality foreseen in legislation or recommended by the World Health Organization. The effects of poor air quality on public health have been felt most strongly in urban areas, with levels of particulate matter (PM) of particular concern;[1] and in ecosystems leading to biodiversity loss.[2]

The SOER 2015 briefing on air pollution provides an overview of the status, trends and prospects relating to air quality. This SOER 2015 cross-country comparison focuses on emissions of a group of four pollutants that contribute to acidification, eutrophication, the formation of ground-level (tropospheric) ozone and PM in the atmosphere, namely nitrogen oxides (NO_X), sulphur oxides (SO_X), ammonia (NH_3) and non-methane volatile organic compounds (NMVOC).

About the indicator

The European Environment Agency (EEA) publishes a range of air pollution indicators providing information on emissions of pollutants by country and sector, and assessment of change in relation to targets. The data presented here are submitted to the EEA under the Gothenburg Protocol to the United Nations Economic Commission for Europe's Convention on Long-range Transboundary Air Pollution (UNECE/LRTAP), and the EU National Emission Ceilings Directive (NEC Directive).

European Union (EU) Member States' emissions data reported under the NEC Directive is compared with NEC Directive ceilings. For Liechtenstein, Norway and Switzerland, data reported under LRTAP is compared with the respective listed emission ceilings of the Gothenburg Protocol. Iceland and Turkey have not signed the Gothenburg Protocol and are therefore not included in Table 1. The EEA has published further details on calculations including methodology, uncertainties and quality assurance procedures.[3] Data presented here are available from the EEA data viewer.[4]

The EEA publishes factsheets summarising key data on air pollution for each of the 33 EEA member countries. Indicators on past and future emission trends are presented, as well as a summary of the national air quality situation in each country.[5]

Policies, targets and progress

Annual emission limits, known as emission ceilings, for NO_X, SO_X, NH_3 and NMVOC are set by the Gothenburg Protocol to the UNECE/LRTAP, and the NEC Directive with the aim of protecting the environment and human health. The 2012 revision to the Gothenburg Protocol extended existing emission ceilings for 2010 until 2020 obliging countries to maintain emission levels below their 2010 ceilings, or to further reduce emissions if they have not yet met these ceilings.

Table 1: Progress by 32 European countries in meeting the emission ceilings of the NEC Directive or Gothenburg Protocol of the UNECE/LRTAP Convention (2011 and 2012)

Countries	NOx 2011	NOx 2012	SO2 2011	SO2 2012	NH3 2011	NH3 2012	NMVOC 2011	NMVOC 2012
Austria	41	37	-51	-54	-6	-6	-21	-16
Belgium	18	17	-45	-50	-8	-8	-24	-24
Bulgaria	-45	-50	-38	-61	-63	-64	-48	-48
Croatia	-25	-32	-52	-63	37	39	-19	-24
Cyprus	-10	-9	-46	-58	-43	-45	-31	-34
Czech Republic	-21	-27	-38	-40	-18	-21	-38	-40
Denmark	-1	-9	-75	-77	4	3	-6	-9
EU-27	-4	-7	-47	-51	-17	-18	-22	-23
Estonia	-40	-46	-27	-59	-64	-63	-32	-31
Finland	-10	-14	-45	-53	19	20	-18	-20
Former Yugoslav Republic of Macedonia	3	-10	-8	-19	-3	-12	-8	-8
France	24	21	-34	-38	-8	-13	-30	-32
Germany	23	21	-18	-18	2	-1	-1	-4
Greece	-14	-25	-50	-53	-16	-16	-39	-42
Hungary	-34	-41	-93	-94	-32	-35	-27	-28
Ireland	6	10	-41	-45	-11	-10	-19	-22
Italy	-6	-8	-59	-61	-9	-3	-15	-18
Latvia	-44	-42	-97	-98	-60	-60	-48	-44
Liechtenstein	76	88	-73	-71	13	14	-52	-51
Lithuania	-49	-47	-80	-75	-56	-55	-36	-36
Luxembourg	61	55	-56	-50	-36	-36	-7	9
Malta	-2	8	-12	-14	-48	-49	-75	-73
Netherlands	-1	-5	-33	-32	-2	-6	-20	-21
Norway	11	5	-17	-24	16	17	-31	-30
Poland	-3	-6	-34	-38	-42	-44	-15	-15
Portugal	-29	-32	-62	-65	-47	-47	-5	-6
Romania	-49	-48	-65	-72	-24	-25	-32	-32
Slovakia	-34	-38	-38	-47	-38	-35	-51	-56
Slovenia	3	0	-60	-62	-11	-12	2	-2
Spain	8	6	-39	-45	8	8	-9	-12
Sweden	-6	-11	-56	-59	-9	-10	-22	-23
Switzerland	-11	-12	-59	-59	-1	-2	-40	-41
United Kingdom	-10	-9	-34	-27	-5	-7	-30	-31

Note: Countries that were below the national ceiling have a green value, e.g. -5% has a light green background, -45% has a darker green. Countries that exceeded the ceiling have a red background colour and a positive percentage value. Croatia joined the EU in July 2013 and therefore data is shown for information purposes only.

Data sources: EEA. National Emission Ceilings (NEC) Directive Inventory

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Emissions of NO_X, SO_X, NH_3 and NMVOC have decreased over the last two decades. Emissions of NO_X have decreased by 44%, SO_X by 74%, NH_3 by 25% and NMVOC by 57% since 1990 within the EEA-33. In 2013, eleven countries reported emissions above their ceilings for NO_X (Austria, Belgium, France, Germany, Ireland, Liechtenstein, Luxembourg, Malta, Norway, Slovenia and Spain), five for NH_3 (Denmark, Finland, Liechtenstein, Norway and Spain) and one for NMVOC (Luxembourg).[3][6] All countries met their emission ceilings for SO_X (see Table 1).

In 2012, 14 countries breached at least one emission ceiling, compared to 13 in 2011 and 15 in 2010. Liechtenstein, Luxembourg, Norway and Spain exceeded two ceilings in 2012. Several countries have persistent problems meeting their emission limits with Austria, Belgium, France, Germany, Ireland, Liechtenstein, Luxembourg, Norway and Spain breaching NO_X ceilings for three consecutive years. Denmark, Finland, Liechtenstein, Norway and Spain have breached NH_3 ceilings for three consecutive years.

The EEA indicator 'emissions of main air pollutants'[7] provides further details on these four individual pollutants. The assessment of change in emissions since 1990 and comparison to NEC Directive and Gothenberg Protocol targets for NO_X is shown in Figure 1 as this is the pollutant with the greatest number of exceedances of emission ceilings by countries.

The majority of EEA-33 countries have reported lower emissions of NO_X in 2012 compared to 1990. The exceptions to this are Turkey (whose emissions were nearly 2 times higher in 2012 than 1990), Cyprus (34% higher), Luxembourg (18%) and Malta (15%).

Of the EU Member States, Germany and France reported the highest exceedances of the NO_X ceilings in absolute terms in 2012, by 222 and 173 kilotonnes respectively. In percentage terms, Luxembourg (55%) and Austria (37%) continued to exceed their NO_X emission ceilings the most in 2012.[6]

Although there has been a large reduction in NO_X emissions from the road transport sector, it remains one of the main contributory factors behind the large number of NO_X exceedances. This is in part because the sector has grown more than expected and partly because of the increased penetration of diesel vehicles. These have higher NO_X emissions than petrol-fuelled vehicles and emission standards set in EU legislation have not always delivered the anticipated level of reductions.[4]

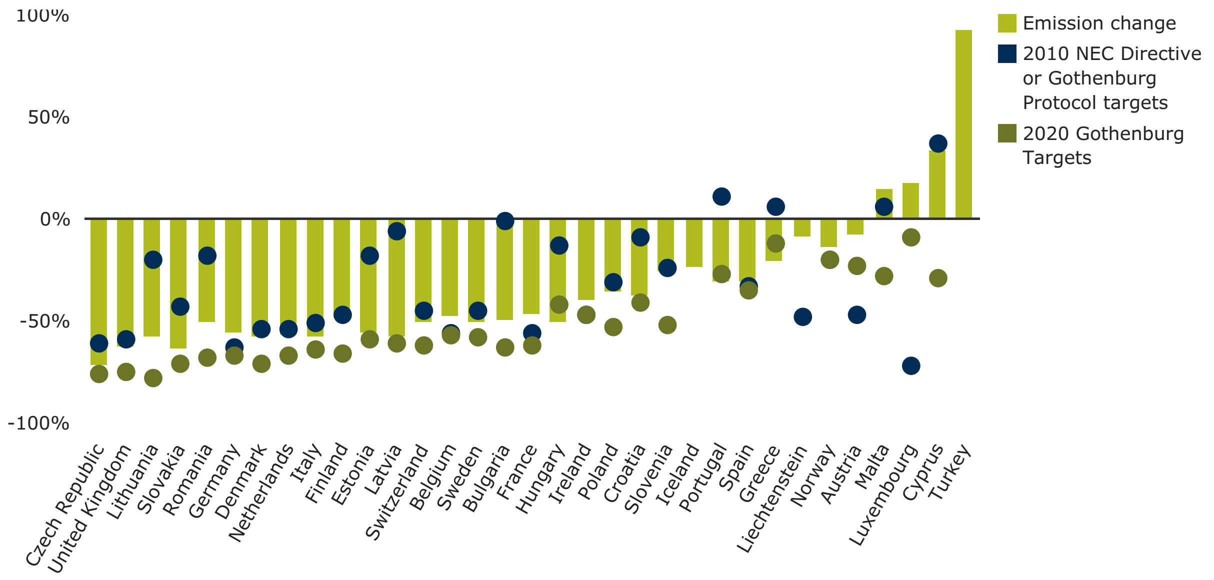
Prospects

Despite improvements in recent decades there are still major challenges in reducing air pollution and direct and indirect impacts on human health, the economy and environment. Road transport, industry, power plants, households and agricultural activities continue to emit significant amounts of air pollution.

Thirty EEA member countries have 2020 emission reduction targets set under the 2012 revised Gothenburg Protocol. For all four pollutants, the majority of countries are making progress towards meeting these targets.[3] For SO_X, fifteen countries have already met the proposed 2020 targets according to emissions data for 2012. For NH_3, sixteen countries met their ceilings and nine countries have met celings for NMVOC. Only one country (Portugal) has already met its NO_X target in 2012, while six countries have met new 2020 targets for primary $PM_{2.5}$ emissions.[7]

Management of air pollution is challenging because of its cross-border nature, the need to address the many sources of emissions, and the different spatial scales of the resulting pressures and impacts. European air policy has undergone substantial review and in 2013 the proposed Clean Air Policy Package[8] included a measure to strengthen national emission reduction commitments by revising the NEC Directive to set emission ceilings for 2020 and 2030 for the four pollutants (NO_X, NMVOC, SO_X and NH_3), as well as two additional pollutants, fine particulate matter ($PM_{2.5}$) emitted directly into the air and methane. Proposed actions also include focusing on air quality in cities, national and local actions. The implementation of measures to improve air quality and ameliorate impacts often takes place at regional and local level. Therefore sharing of information and experiences amongst countries is an important factor in improving knowledge and providing tools for air quality planning.

Figure 1: Change in emissions of NO_X (nitrogen oxides) in 33 European countries (1990 to 2012) and comparison with the 2010 NEC Directive and Gothenburg Protocol targets



Note: 2020 Gothenburg targets scaled from 2005 base year to show percentage reduction from 1990.

Data sources: EEA. National emissions reported to the Convention on Long-range Transboundary Air Pollution (LRTAP Convention)

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Air Implementation Pilot

Almost three quarters of Europeans live in cities. The air quality in our cities is therefore of significant importance to the health of Europeans. Considerable progress has been made in the past twenty years in improving urban air quality, but issues remain. A number of different air pollutants such as nitrogen dioxide, particulate matter, and ozone remain above regulated levels, posing a threat to human health. The Air Implementation Pilot brought together 12 cities with the aim of better understanding the challenges faced in implementing air quality and enabling learning from experience and each other. Lessons learnt relate to data, modelling, monitoring networks, management practices and public information.[9]

Cross-country comparisons

Biodiversity — protected areas

The total area of designated protected areas currently covers about 21% of terrestrial territory and inland waters, although further expansion of the marine network is required to meet targets.

Designation of protected areas is not a guarantee of biodiversity protection. Effective biodiversity conservation within protected areas also requires management with a focus on species, habitats and ecosystems; measures to tackle the causes of biodiversity loss; and coherent networks of protected areas.

Setting the scene

Biodiversity can be defined as the variety of life, and encompasses diversity within species, between species, and of ecosystems. Biodiversity underpins ecosystem functioning and the provision of ecosystem services — the benefits people obtain from nature — which are essential for human well-being.

Despite these benefits, its importance for humans, and its intrinsic value, biodiversity continues to be lost. Information reported by European Union (EU) Member States under the Habitats and Birds Directives indicate that 60% of assessments concerning relevant animal and plant species, and 77% of assessments concerning habitat types show unfavourable conservation status. Biodiversity loss is also a concern in non-EU member countries.

Designation of protected areas is an important policy tool to halt biodiversity decline. Areas can be protected under national, European or international legislation, on the basis of widely varying criteria, and with different objectives and management regimes. The SOER 2015 briefing on biodiversity provides an overview of the status, trends and prospects at a European level. This SOER 2015 cross-country comparison focuses on nationally protected areas.

About the indicator

The EEA publishes an indicator on nationally designated areas as part of the Streamlining European Biodiversity Indicators (SEBI) set.[1] Data on national designations are reported voluntarily, and the Common Database on Designated Areas (CDDA) [2] contains 685 different types of protected-area designations that have been applied across 39 countries.

There is a high degree of variability in national designations. Therefore, the international classification of protected areas adopted by the International Union for Conservation of Nature (IUCN) has been used to present a general picture across countries.[3] The IUCN defines protected areas as 'a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values'.

The data presented here is the CDDA version 12 on spatial data and does not include Greenland or overseas territories. As designations can be overlapping, the total area is an overestimate. Not all nationally designated areas have been assigned IUCN categories, therefore all data for Turkey, Bosnia and Herzegovina and some sites within other countries are shown as unassigned. There are also differences amongst countries in interpretation and application of the IUCN categories. The EEA has published further information on the diversity of national approaches.[4]

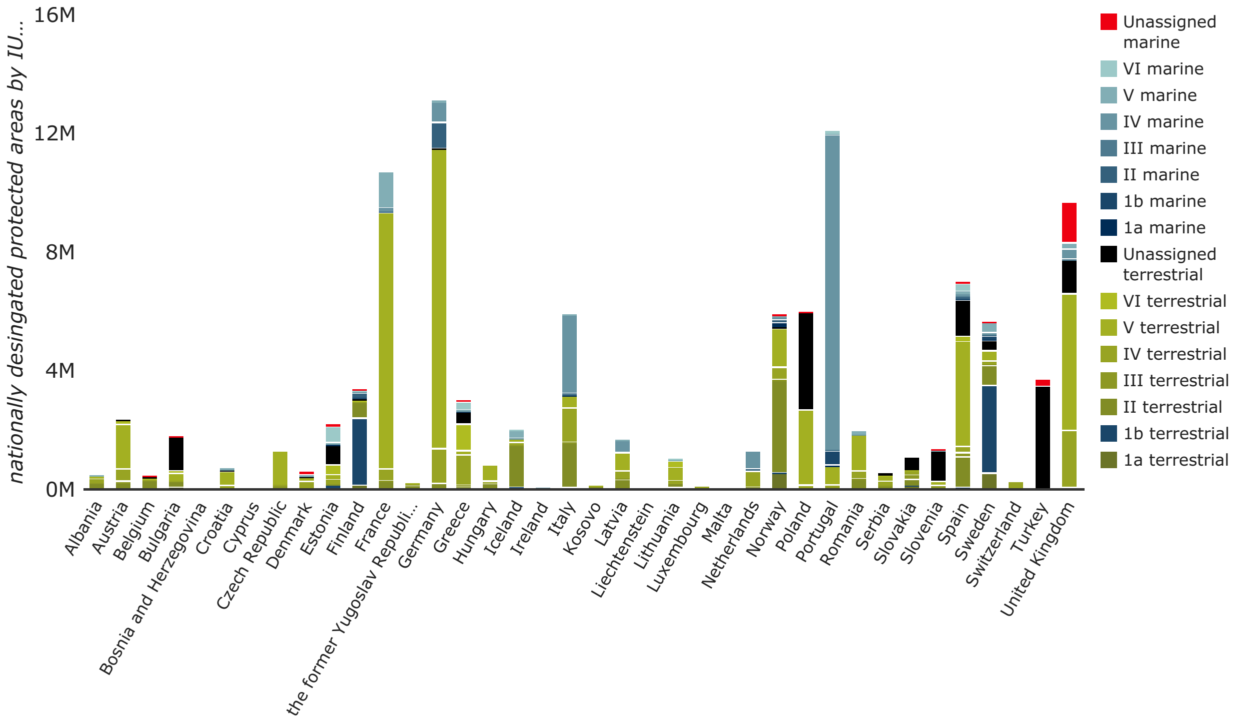
Policies, targets and progress

Historically, protected areas have taken many forms and have been established for different purposes, such as protecting the resource of wild game, preserving natural beauty, or more recently, safeguarding biodiversity and ecosystem services. The last century has seen a large increase in both the number of protected areas and their spatial coverage worldwide. In addition to national policies, a range of international and European policies are important for protected areas.[4] These include the UN Convention on Biological Diversity (CBD), the Ramsar Convention on Wetlands, and the EU's Birds and Habitats Directives.

The UN CBD 'Aichi' targets adopted in 2010 require countries to ensure that by 2020 at least 17% of their terrestrial and inland water areas, and 10% of their coastal and marine areas, are conserved through a system of protected areas.[5] The EU Biodiversity Strategy to 2020 sets additional targets relating to species, habitats and ecosystems protection.[6]

Europe has a high diversity of protected areas, which vary in size, aim and management approach. Analysis shows the most common IUCN categories of terrestrial protected areas amongst countries are national parks (designated as category II), habitat/species management areas (category IV) and protected landscapes/seascapes (category V). Categories IV and V are the most common marine protected areas (Figure 1).

Figure 1: Nationally designated protected areas by IUCN category in 38 European countries



Data sources: a. EEA. Nationally designated areas (CDDA) b. EEA – Indicator SEBI007

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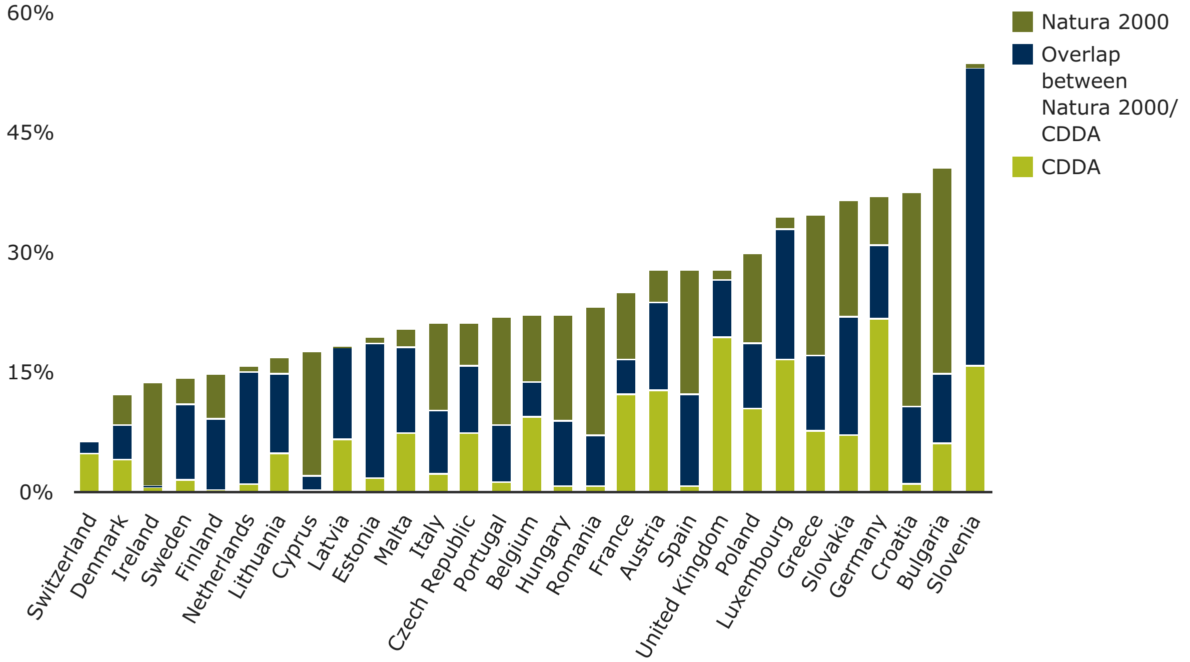
Europe has a large number but relatively small size of protected areas. Approximately 90% of sites are less than 1 000 hectares (ha). This reflects the high pressure on land use, arising from agriculture, transport and urban development. Large-scale nature reserves under category Ib and II occur mostly in countries with a low population density, such as Norway, Iceland, Finland and Sweden. It is difficult to compare other categories across countries because of the interpretation differences that exist. This is particularly true for category V, which comprises areas that are highly variable in character and management.

The two most important European networks of protected areas are Natura 2000 and the Emerald Network. Natura 2000 covers 18% of Europe's land and 4% of its marine waters, with 52 million ha designated as Special Protected Areas (SPAs) under the Birds Directive and 65 million ha as Sites of Community Importance (SCIs) under the Habitats Directive.[4] The Emerald Network currently includes 37 sites designated by Switzerland, with Norway soon to add 600 sites.

Natura 2000, in combination with nationally designated protected areas, has resulted in around 1 222 725 km^2 (or 21% of land and inland waters) and around 338 000 km^2 (or 5.9% of EU marine areas) being designated. The majority of countries have achieved the 17% Aichi target, although further expansion of the marine network is required to meet policy targets, with countries having to designate in less than 7 years, the same amount of marine protected areas as over the last 20 years.

Figure 2: Complementarity between European designations (Natura 2000 and the Emerald Network) and national designations by share of terrestrial area in 29 European countries



Note: The overlap for Switzerland refers to Emerald Network sites rather than Natura 2000. CDDA — Common database of designated areas.

Data sources: a. EEA. Nationally designated areas (CDDA) b. EEA. Natura 2000 data - the European network of protected sites c. FOEN. Swiss Emerald network sites d. EEA – Indicator SEBI007

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The degree of overlap between Natura 2000 and national designations illustrates the extent to which countries have made use of their nationally designated areas to underpin Natura 2000 and to what extent Natura 2000 sites extend beyond national systems. There are different patterns amongst countries, as some Natura 2000 sites nearly always overlap with national designations. In others, there is little overlap (Figure 2).

Natura 2000 sites mostly overlap with nationally designated sites under IUCN categories I to IV, which aim to protect ecological processes and biodiversity. However, they also overlap with IUCN categories V and VI, particularly in mountainous regions, supporting the idea that Natura 2000 is not restricted to nature reserves but also serves the broader principle of conservation and sustainable use.[4]

Prospects

The biggest increases in protected areas have occurred in recent decades, and except in the marine environment, substantial additional designations within Europe are not to be expected. However, what is likely to change is the perceived value of protected areas in society, as well as the external pressures affecting their quality.

The benefits that protected areas and resilient ecosystems can provide is increasingly recognised and explicitly acknowledged, for example in the EU's 7th Environment Action Programme, with its priority objective of protecting, conserving and enhancing the EU's natural capital.[7]

The economic benefits from the Natura 2000 network have been estimated in the order of EUR 200–300 billion per year, while the annual costs associated with managing and protecting the network are approximately EUR 5.8 billion.[8]

> Protected areas not only contribute to essential regulating ecosystem services, such as climate regulation and water purification, but may also support local and national economies through tourism and the supply of forest products, fish and other resources. Although economic arguments have gained more weight and acceptance in recent years, the intrinsic value of protected areas still remains a fundamental reason for their continued protection and management.

Designation of protected areas is not a guarantee of biodiversity protection, as many protected areas are not currently managed at all, or are not managed with a focus on species and ecosystems. Apart from adequate internal management, effective biodiversity conservation within protected areas will require measures to reduce external pressures such as eutrophication and acidification (mainly as the result of agriculture and fossil fuel combustion), fragmentation resulting from infrastructure development, invasive alien species (IAS), and climate change, as well as the impacts these pressures have on species, habitats and ecosystems.

Protected areas can no longer be perceived and managed as isolated units, but need to be understood as part of a wider ecological network. An ecologically coherent network requires both spatial and functional connectivity across borders. The EU Biodiversity Strategy target to establish green infrastructure as a means of maintaining and enhancing ecosystems and their services and to restore at least 15% of degraded ecosystems; the EU Strategy on Green Infrastructure[9]; and the Marine Strategy Framework Directive aim to strengthen the coherence of protected area networks across Europe. The transfer of information and knowledge will also improve protected area networks by contributing to effective management.

Cross-country comparisons

Energy — energy consumption and share of renewable energy

There was a small overall increase in gross inland energy consumption (GIEC) from 1990 to 2012, however national trends varied significantly with consumption increasing in 20 and decreasing in 13 countries.

From 1990 to 2012 there was an increase in the share of renewable energy in GIEC in 32 out of 34 countries.

There has been progress in energy efficiency policy but there is significant variation in the level of ambition and coherence of policy measures amongst countries.

Setting the scene

Energy production and use causes numerous environmental and health impacts. Today, fossil fuels continue to dominate the energy mix in Europe, contributing to climate change and air pollution. This highlights the need to rethink energy systems and move quickly to a low carbon economy and society.

The SOER 2015 briefing on energy provides an overview of the status, trends and prospects relating to energy production and use at a European level. This SOER 2015 cross-country comparison focuses on GIEC and the contribution of renewable energy.

About the indicator

Partly as a result of numerous policy and reporting frameworks at national, European and international levels, a variety of measures and definitions are used to quantify energy generation and use. European Environment Agency (EEA) indicators provide information on primary energy consumption, GIEC, final energy consumption and gross final energy consumption.[1]

The indicator 'GIEC by fuel' measures the quantity of energy consumed within the national territory of a country by fuel type and it is expressed in tonnes of oil equivalents. It is regularly published as part of Eurostat energy statistics and has a high comparability amongst countries and over time.

Policies, targets and progress

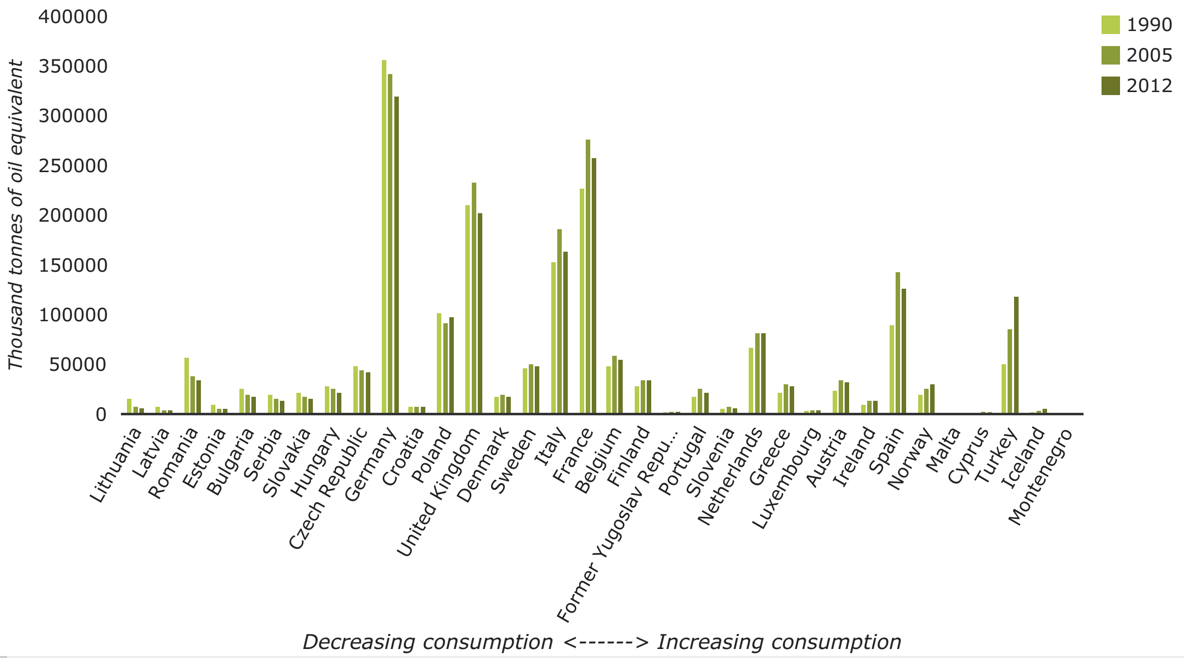
Energy is an important policy priority. As part of the Europe 2020 Strategy,[2] the EU has committed that by 2020, it will reduce greenhouse gas (GHG) emissions by 20% compared to 1990 levels; increase the share of renewable energy sources to 20% of gross final energy consumption; and increase energy efficiency by cutting primary energy use by 20%.[3]

Transposing European energy policy frameworks into effective national legislation is not without challenges. National policy frameworks are evolving across Europe with debates at local, national and European level on how to achieve the transition towards a low-carbon and energy-efficient future.[4]

The EEA has published climate and energy profiles for each EEA member country. The profiles provide information on energy demand and on progress towards meeting targets for renewable energy and for energy efficiency.[5] The profiles also provide information on national targets, policies and measures for both renewable energy and energy efficiency.

There was a small overall increase in total GIEC in European countries from 1990 to 2012 although it remained fairly constant for the EU-28 as a whole. National trends vary significantly during this period with GIEC decreasing in 13 countries and increasing in 20 (see Figure 1). The largest percentage decreases were recorded in Lithuania, Latvia and Romania, reflecting structural changes in the economy and improved energy efficiency. The largest increases were recorded in Iceland, Turkey and Cyprus.

Figure 1: Gross inland energy consumption in 34 European countries (1990, 2005 and 2012)



Note: Countries are in order of the percentage change in gross inland energy consumption from 1990 to 2012 with Lithuania having the largest decrease and Iceland the largest increase. Only 2005 and 2012 data is available for Montenegro.

Data sources: Eurostat. Gross inland energy consumption, by fuel

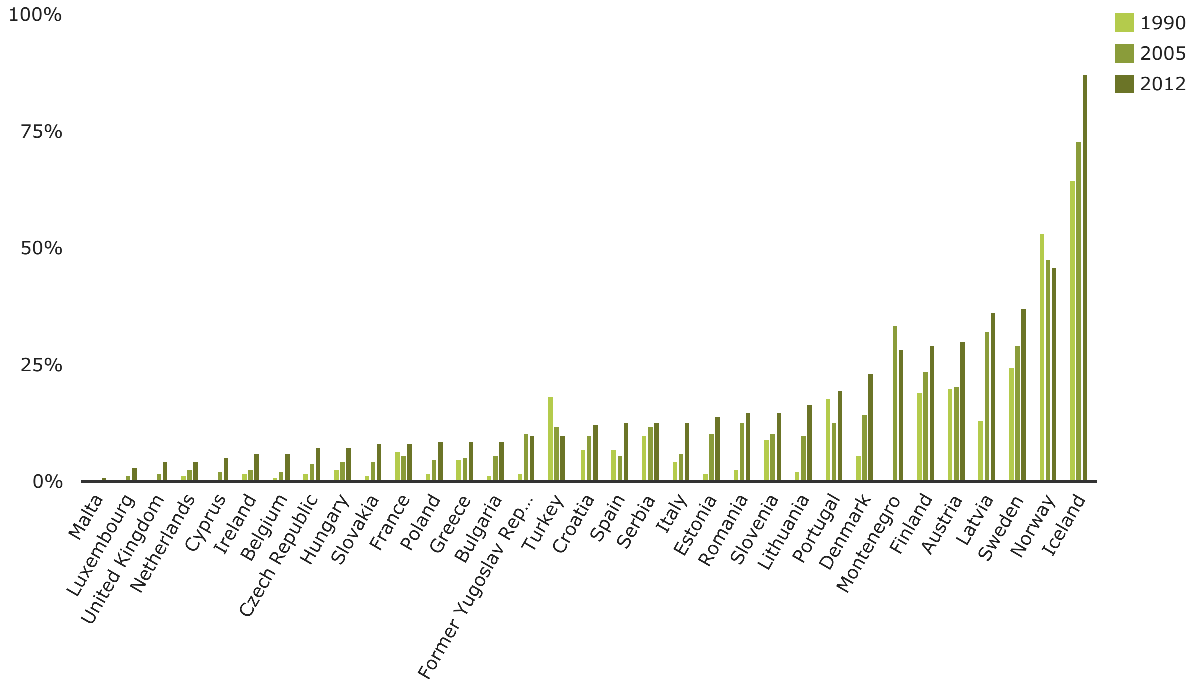
European Environment Agency

Changes in the fuel mix used to generate energy have an important influence on environmental impacts. Although consumption of solid fuels (coal and lignite) and oil have declined since 1990, consumption of coal has increased again in recent years. The overall share of renewable energy sources in GIEC more than doubled between 1990 and 2012. However, there was substantial variation amongst countries in how the fuel mix changed over this period.

Between 1990 and 2012, there was an increase in the absolute quantity of renewable energy contributing to GIEC in all countries except Serbia. The percentage share also increased between 1990 and 2012 in all countries except Turkey (–8.3%) and Norway (–7.5%), with the largest percentage increases recorded in Latvia (23.2%), Iceland (22.9%) and Denmark (17.6%) (see Figure 2).

Developments concerning renewable energy should be considered in the context of very different national baselines against which change has been measured. Norway started from a relatively high baseline, and from 1990 to 2012 it had the second highest share of renewable energies in the fuel mix.

Figure 2: Percentage share of renewable energies in gross inland energy consumption in 34 European countries (1990, 2005 and 2012)



Data sources: a. Eurostat. Gross inland energy consumption, by fuel b. EEA – Indicator ENER029

European Environment Agency

Prospects

Reducing energy consumption, improving energy efficiency, and increasing the share of renewable energy are the main ways that European countries are responding to the challenges of reducing GHG emissions, improving energy security, improving resource efficiency, and reducing exposure to the volatility of fossil-fuel prices on the world market. However, in many countries, the economic crisis has led to a reduction in the resources available for activities such as the enforcement of standards in the building sector, or for financial assistance for energy efficiency measures and renewable energy.

The EU will meet its 20-20-20 commitments on GHG emissions and renewables. Although it may just fall short of its commitment to cut primary energy use by 20% by 2020, particularly if the reductions in energy use resulting from the 2008 economic crisis and subsequent recessions are not sustained.

The majority of countries are making progress in terms of increasing the share of renewables. The target to increase the share of renewable energy sources to 20% is based on gross final energy consumption rather than GIEC. The EEA has published an assessment of the share of renewable energy in gross final energy consumption in EEA member countries along with an indication of progress towards national targets (where applicable).[4] In 2012, only three countries had not reached the indicative trajectories for meeting renewable energy targets (France, Malta and the Netherlands).[4] According to national forecasts 23 EU Member States expect to meet their binding 2020 renewables target on their own without having to use statistical transfers or other cooperation mechanisms provided by the Renewable Energy Directive.[6]

Countries have selected different approaches when setting their national target to reduce primary energy use by 20% by 2020. Some focus on primary energy consumption, others on final energy consumption or primary energy intensity.[1] Different modelling frameworks and assumptions have also been used along with the adoption of a range of different base years against which progress will be measured.

As each national target reflects specific national circumstances, this has led to different ambitions, with countries aiming for either a reduction in energy consumption, stabilisation, or a cap on how much energy consumption can increase relative to a baseline year. Targets are also under revision in some countries, with a range of national policy developments underway that will impact on the final target. The EEA has published a study comparing the situation in 2011 to national targets. [5]

While there has been a lot of progress in energy efficiency policy, there is significant variation between countries in the level of ambition and coherence of their policy measures and how they implement and monitor their policies. Some have developed a well-balanced package of measures across different sectors whereas others do very little beyond the minimum required by EU directives. The EEA has made an overall assessment of EU Member States' progress towards improving energy efficiency.[4] As further improvements are required in the majority of countries, some examples of good practice in energy efficiency are highlighted below.

Denmark provides a positive example in terms of creating an overall support framework characterised by strong links between national and regional strategies, good coordination, transparency, information and education activities, and involvement of regional and local authorities in the policy framework.

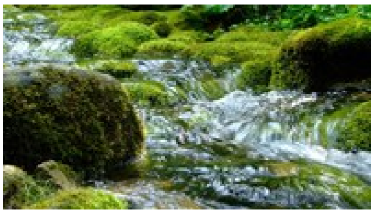
Significant progress has been observed in most countries in the public and building sectors and in setting up appropriate governance structures for energy efficiency, such as energy agencies. Finland and Belgium are examples of good practice in the public sector, with Finland developing a coherent sectoral strategy and Belgium implementing measures so the public sector can act as a role model. Germany and France provide examples of good practice in relation to the building sector. France has taken a leading role in enforcement, while Germany has led in relation to information, financing and setting up a governance framework.

For energy policy more broadly, good practice concerning education, capacity building and energy audits are found in Austria, Estonia and Finland. Bulgaria represents a good example for setting targets for individual companies and Sweden is a good example in setting targets for energy-intensive industries.

Improving energy efficiency and increasing renewable energy will not only reduce GHG emissions and improve air quality, but also contribute to a reduction in environmental pressures and impacts in areas such as human health, water, biodiversity, resource use, and land use. Integrated planning of renewable energy projects and infrastructures with sharing of best practice amongst countries will be essential to improving deployment of renewable energy sources and enhancing public support for these projects.

Cross-country comparisons

Freshwater quality — nutrients in rivers



Nutrient enrichment of Europe's freshwaters is a concern, with pollution from agriculture a cause of poor water quality.

Average nitrate concentrations in European rivers reduced by over 20% between 1992 and 2012, whilst orthophosphate concentrations more than halved.

Enhanced integration of water policy objectives into other policy areas, especially agriculture, is essential to ensure that a sufficient quantity of good quality water is available for people's needs and the environment.

Setting the scene

Europe's freshwaters are affected by a range of pressures, including water pollution, water scarcity, floods, and modifications to water bodies that affect morphology and water flow. Nutrient enrichment of freshwaters is widespread. The main sources of nitrogen and phosphorus include point source emissions from urban wastewater treatment plants and industry, and diffuse emissions from agricultural production.

Eutrophication, resulting from excessive inputs of nitrogen and phosphorus to water bodies, results in changes in species' abundance and diversity, as well as problematic algal blooms that result in lower oxygen levels and turbid waters. Excessive nutrient concentrations in rivers can also promote eutrophication in receiving coastal waters. These ecological changes can cause a loss of biodiversity and have negative impacts on the use of water for human consumption and other purposes. This has implications for the provision of ecosystem services such as drinking water, fisheries, and recreation opportunities, and can be costly to remediate.

The SOER 2015 briefing on freshwater quality provides an overview of the status, trends and prospects at a European level. This SOER 2015 cross-country comparison focuses on nutrients, specifically nitrates and orthophosphates in rivers.

About the indicator

The EEA indicator ' nutrients in freshwaters ' provides information on annual average nutrient concentrations in groundwater, rivers and lakes. The data presented here are annual average nitrate (or total oxidised nitrogen) and orthophosphate (or total phosphorus) concentrations. Data are collected annually through the Water Information System for Europe — State of Environment (WISE-SoE) collection process, and are sub-samples of national data. More detailed and extensive national data sets are available but this dataset has been assembled for the purpose of providing comparable indicators on a Europe-wide scale.

The indicator only uses complete time series in the assessment. This ensures that the aggregated data series are consistent, i.e. they include the same stations throughout the time series. In this way, assessments are based on actual changes in concentrations and not changes in the number of stations.

The data sets include almost all EEA member and cooperating countries but the time coverage varies amongst countries. See [1] for full details on data handling, methodology, and quality assurance procedures. A 21-year time series (1992–2012) is presented for those countries for which it is available. A 13-year time series (2000–2012) is used for the assessment of change over time, as it is available for the largest number of countries. Finally, those countries with incomplete datasets are included in the figures, but not in any assessment of change over time, as a sufficient time series is needed to assess change due to the inter-annual variability in nutrient concentrations related to factors such as weather and river flow levels.

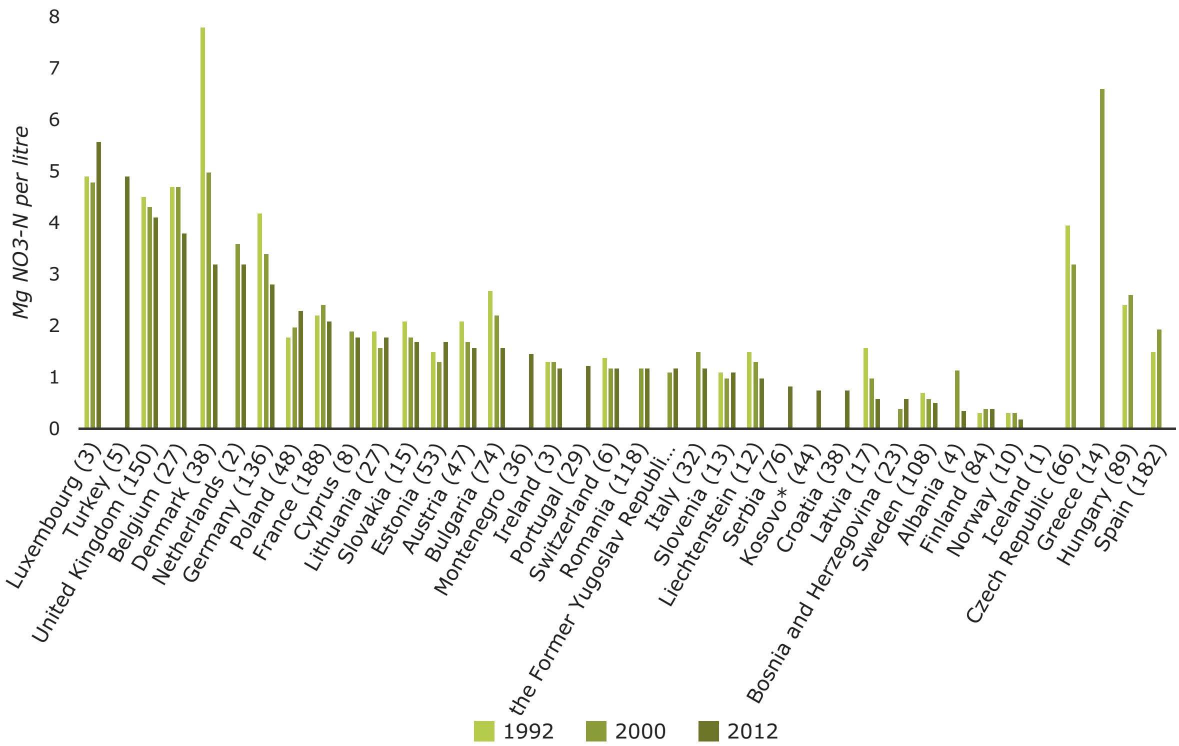
Policies, targets and progress

The main aim of European water policy is to ensure that a sufficient quantity of good quality water is available for people's needs and the environment. The quality of surface waters with respect to eutrophication and nutrient concentrations is an objective of a range of European policies, namely the Water Framework Directive, Nitrates Directive, Urban Waste Water Treatment Directive, Integrated Pollution Prevention and Control Directive, and the Drinking Water Directive, as well as national policies.

There has been a significant reduction in the levels of nutrients in European freshwaters over the past two decades. This is predominantly due to improvements in wastewater treatment and to reduction in point discharges of nutrients and organic pollution to freshwater bodies resulting from implementation of the Urban Waste Water Treatment Directive. The reduction in nutrient levels are also the result of progress in some regions in reducing nitrate pollution from agriculture under the Nitrates Directive.[1] However, diffuse pollution from agriculture remains a significant pressure in more than 40% of Europe's water bodies in rivers and coastal waters, and in one third of the water bodies in lakes and transitional waters.[2]

River-draining land subject to intense agricultural production and/or with high population densities (and hence significant input from wastewater treatment plants) tend to have the highest nitrate and phosphorus concentrations. Rivers in more sparsely populated countries of northern Europe and mountainous regions generally have significantly lower average river nitrate concentrations (Figure 1). Reductions in nitrate concentration in rivers are related to changes in how both agriculture and wastewater treatment are managed.

Figure 1: Average concentration of nitrate-nitrogen in rivers in 38 European countries (1992, 2000 and 2012)



Data sources: EEA. Waterbase - Rivers

Note: Please see reference [3] for additional information

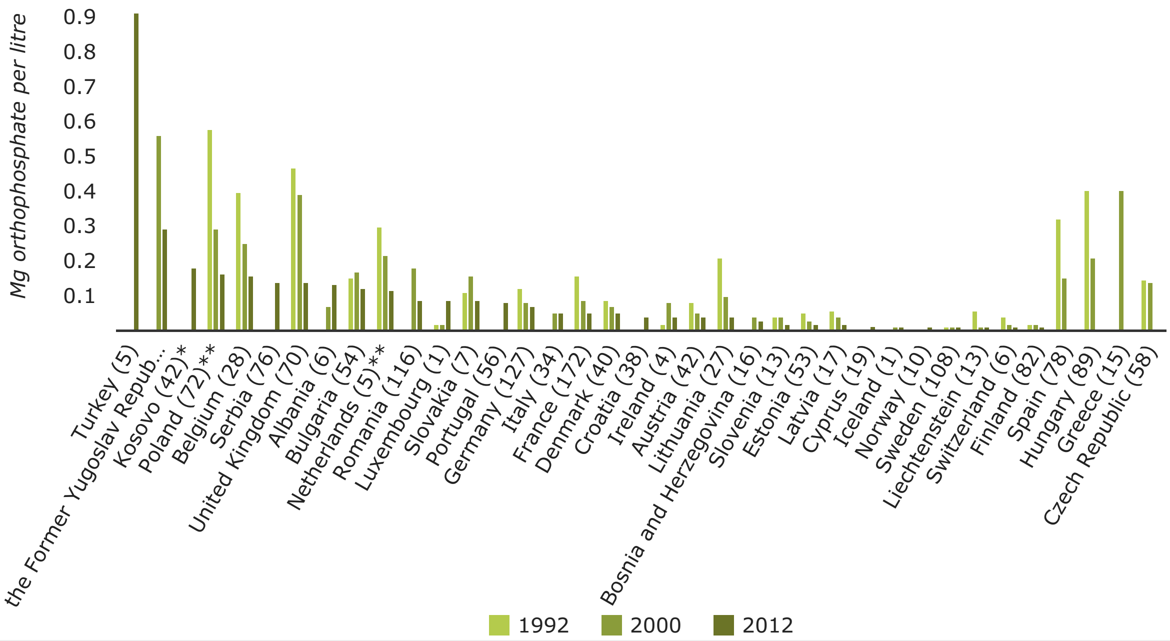
The average nitrate concentration in European rivers has reduced steadily over the period 1992 to 2012, a reduction of 0.5 mg NO_3-N/l, or 0.03 mg NO_3-N/l (0.8%) per year. Overall, there has been a decrease at 44% of stations and an increase at 13%. The countries with the highest proportion of stations with significant decreasing trends are Denmark and Germany. Denmark and Germany also had the largest annual decrease, along with Bulgaria and Latvia. The EEA also publishes interactive maps of the annual mean concentrations of nitrates.[4]

In 2012, the countries with the highest nitrate concentrations in rivers were Luxembourg, Turkey, the United Kingdom, Belgium and Denmark (Figure 1). Downwards trends in nitrate concentrations in rivers have been recorded in the United Kingdom, Belgium and Denmark, with no significant trend recorded in Luxembourg. Belgium has reported improved compliance with the Urban Waste Water Treatment Directive during this period, as well as reductions in the application of both manure and mineral fertilisers in the Wallonia region.[5] In Denmark, the reduction in nitrate levels may be related to the effective implementation of the national action programme under the Nitrates Directive and high compliance levels.[5]

With regards to phosphate, average concentrations in European rivers have decreased markedly over the last two decades, falling by more than half, a rate of 2.1% per year. In 2012, the countries with the highest orthophosphate concentrations in rivers were Turkey, the former Yugoslav Republic of Macedonia, Kosovo under UNSCR 1244/99, Poland and Belgium (Figure 2).

There has been a reduction in orthophosphate concentrations at 52% of river stations while there has been an increase at only 9%. The countries showing the strongest decreasing trends were Austria, Belgium, Denmark, France, Germany, Latvia, Liechtenstein, Lithuania, Switzerland and the United Kingdom. The reduction in phosphorus concentrations in rivers reflects both improvement in wastewater treatment and reductions in phosphorus in detergents.

Figure 2: Average concentration of orthophosphate in rivers in 37 European countries (1992, 2000 and 2012)



Data sources: EEA. Waterbase - Rivers

European Environment Agency

Note: Please see reference [6] for additional information

Prospects

Despite the progress outlined above, nutrient enrichment of Europe's freshwaters remains a concern. Reductions reflect improvements in wastewater treatment. However, diffuse pollution from agriculture in particular remains a major cause of poor water quality currently observed in parts of Europe.

European and national policies are in place to promote a continued reduction in nutrient emissions from both point and diffuse sources. There are now high levels of compliance with the Urban Waste Water Treatment Directive in many countries, but further progress is needed in others. However, significant challenges remain in ensuring compliance with Nitrates Directive action programmes, with a particular focus on compliance with the limits on application rates for manures and fertilisers.[5] The rate of reduction in river nitrate concentrations reflects the continued significance of agricultural nitrogen emissions. Further reduction in nutrient levels will be required to meet the objectives of the Water Framework Directive of achieving good status for water bodies.

However, the integration of water policy objectives into other policy areas needs to be enhanced if the objective of ensuring a sufficient quantity of good quality water is available for people's needs and the environment is to be achieved. Of key importance is the Common Agricultural Policy (CAP) and the recent reforms for the period 2013 to 2020, which contain a number of elements that could greatly improve the interaction between agriculture and water policy. In particular, improved water management, including fertiliser management, is explicitly identified as a priority for rural development.

Diffuse pollution from agriculture is expected to remain an important contributor to river nutrient levels. Mineral fertilisers represent a significant cost for farmers, implying that techniques to reduce the nitrogen demand of crops and losses to the environment are important in reducing direct costs on farmers as well as in improving water quality.

Cross-country comparisons

Mitigating climate change — greenhouse gas emissions

Almost all European countries with an individual greenhouse gas limitation or reduction target under the Kyoto Protocol are on track towards achieving their targets.

The majority of European Union Member States expect to meet their individual emission targets for the non-trading sectors under the Effort Sharing Decision. However, for 14 countries, additional measures are needed to bring emissions below the annual targets from 2013 to 2020.

Setting the scene

Climate change is one of the greatest challenges of our generation. The warming of the climate system is happening with differing impacts and vulnerabilities for nature, the economy and human well-being across Europe.

In order to prevent the most severe impacts of climate change, countries (referred to as 'Parties') having signed up to the United Nations Framework Convention on Climate Change (UNFCCC) agreed to limit the increase in global mean temperature relative to pre-industrial times to less than 2 °C. In order to achieve this goal, countries need to take actions to reduce greenhouse gas (GHG) emissions, known as mitigation actions, and at the same time respond to the occurring and projected impacts of climate change through adaptation actions.

The SOER 2015 briefing on mitigating climate change provides an overview of the status, trends and prospects at a European level, while adaption actions are described in the SOER 2015 briefing on climate change impacts and adaptation. This SOER 2015 cross-country comparison focuses on trends in GHG emissions.

About the indicator

The indicator 'total greenhouse gas emission trends and projections' presents trends of anthropogenic GHG emissions in Europe between 1990 and 2013 and projected emissions between 2010 and 2030. It also assesses the progress of the EU, individual Member States and other EEA countries towards their GHG targets. The GHG emissions presented comprise the six GHGs weighted by their respective global warming potential and presented in CO_2-equivalent units (see [1] for details).

Emissions from international bunkers (international aviation and maritime transport) and land use, land-use change and forestry (LULUCF) are not included in total national GHG emissions.

Policies, targets and progress

European countries have a range of collective and individual targets under different policy processes. They joined the UNFCCC and ratified the Kyoto Protocol both as a whole (in the case of the first 15 EU Member States) and as individual parties. Under the Kyoto Protocol, they must achieve legally binding GHG limitation and emission reduction targets for the first and second commitment periods, 2008 to 2012 and 2013 to 2020 respectively.

To achieve their Kyoto targets, countries must keep their emissions within a certain budget by balancing emissions with the amount of Kyoto units determined by their target. Such a balance is primarily reached by limiting or reducing domestic emissions and enhancing carbon sinks through the contribution of activities, such as forest management. They can also increase their emission budgets through the use of flexible mechanisms whereby they can acquire Kyoto units from other countries. All EEA member countries except Cyprus, Malta and Turkey have Kyoto Protocol targets for the period 2008 to 2012.

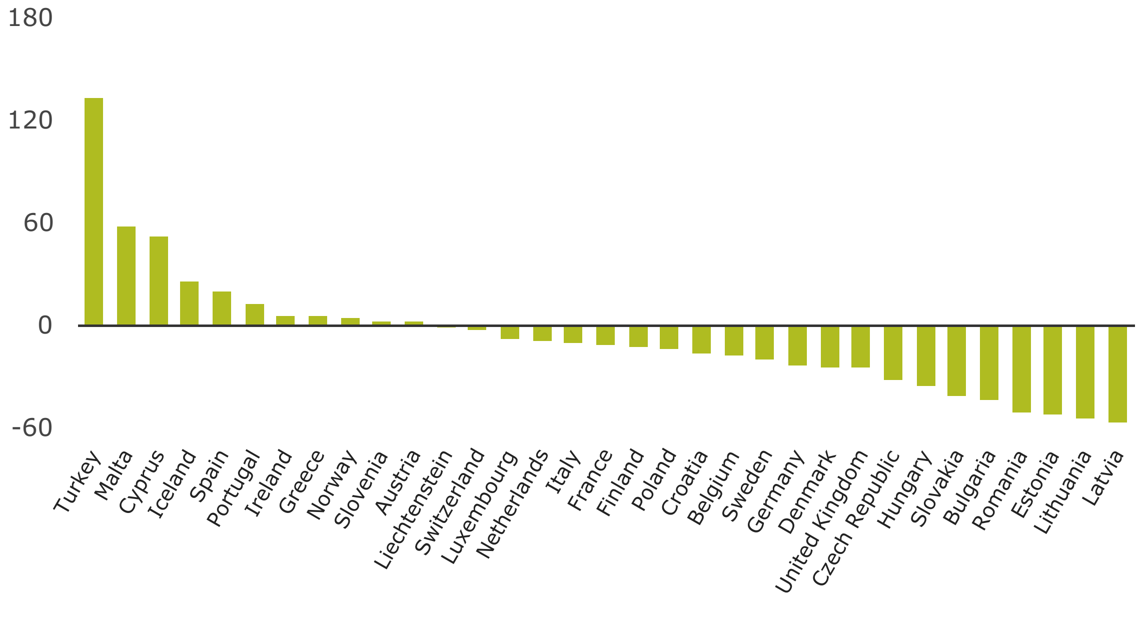
The European Union (EU) aims to cut its GHG emissions by 80–95% below 1990 levels by 2050 in the context of necessary reductions by developed countries as a group. The EU has adopted a target to reduce GHG emissions by 20% from 1990 levels by 2020. To achieve this target (one of the main targets under the Europe 2020 Strategy) a cap for the EU Emissions Trading System (ETS) was set at EU level, and individual national targets for emissions in sectors not covered by the ETS were set under the Effort Sharing Decision (ESD).

Many factors influence GHG emissions, such as changes in energy demand and fuel use, growth in particular economic sectors, increasing transport demand and shifts in transport modes, technological developments, low carbon energy sources, energy efficiency policies, and demographic changes.

The EEA has been publishing an annual assessment of progress by European countries towards achieving their climate mitigation policy objectives.[2] Climate and energy profiles have been developed for each member country, providing information on key GHG data, total and sectoral GHG trends and projections, and progress towards the 2008–2012 Kyoto targets and annual Effort Sharing Decision targets (where applicable).[3] The profiles also provide information on national targets, policies and measures. The EEA greenhouse gas data viewer provides easy access to data, and can show emission trends for the main sectors and allow for comparison between different countries and activities.[4]

In 2012, the EEA countries with the highest GHG emissions were Germany, the United Kingdom and Italy, and those with the smallest GHG emissions were Liechtenstein, Malta and Iceland. Total GHG emissions for the EEA-33 declined by 14% between 1990 and 2012. However, national trends varied significantly, with GHG emissions declining in 22 countries and rising in 11 (Figure 1).

Figure 1: Percentage change in total greenhouse gas emissions in EEA countries (1990–2012)



Data sources: EEA. National emissions reported to the UNFCCC and to the EU Greenhouse Gas Monitoring Mechanism

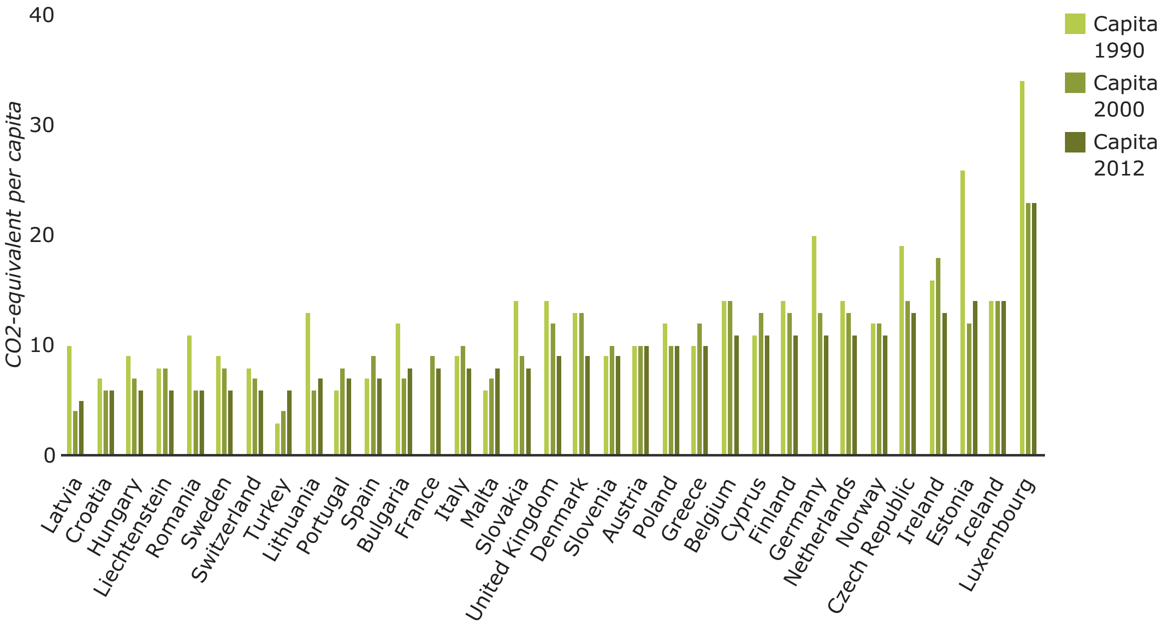
European Environment Agency

The largest absolute reductions between 1990 and 2012 were recorded in Germany, the United Kingdom and Romania, with the largest increases recorded in Turkey, Spain and Portugal. The largest relative reductions were recorded in Latvia (–58%), Lithuania (–56%), Estonia and Romania (–53%), with the largest relative increases recorded in Turkey

(133%), Malta (58%) and Cyprus (52%).

In 2012, the countries with the highest per capita GHG emissions were Luxembourg, Estonia and Iceland, and those with the smallest were Latvia, Turkey and Romania (Figure 2). GHG emissions per capita for the EEA-33 declined by 22% between 1990 and 2012. However, national trends varied, with a decline in 26 countries, no change in 3, and a rise in 4. The largest reductions between 1990 and 2012 were recorded in Lithuania, Latvia and Romania, with the largest increases recorded in Turkey, Malta and Portugal.

Figure 2: Greenhouse gas emissions per capita in EEA countries (1990, 2000 and 2012)



Data sources: a. EEA. National emissions reported to the UNFCCC and to the EU Greenhouse Gas Monitoring Mechanism
b. Eurostat. Population on 1 January by age and sex

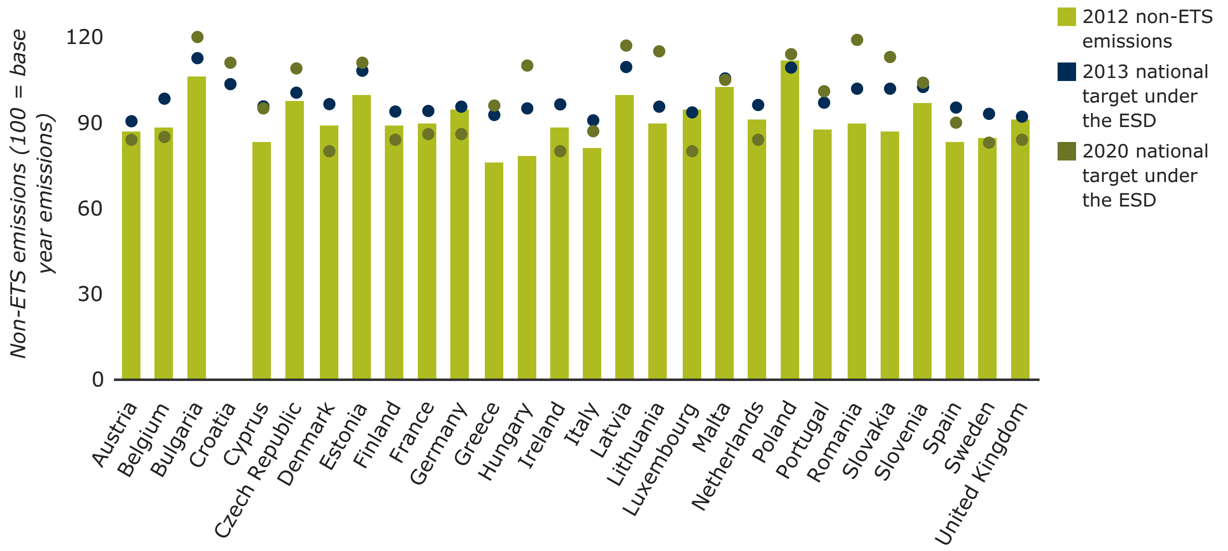
European Environment Agency

Almost all European countries with an individual GHG limitation or reduction target under the Kyoto Protocol have already achieved their respective targets for the first commitment period 2008–2012, taking into account the contribution of carbon sink enhancing activities, such as forestry. The purchase of emission reduction credits will help 12 European countries reach their individual target (Austria, Belgium, Denmark, Ireland, Italy, Liechtenstein, Luxembourg, the Netherlands, Norway, Portugal, Spain and Switzerland).

Prospects

EU Member States also have national annual targets for the period 2013 to 2020 under the ESD. Projected progress towards meeting the 2013 and 2020 targets is shown in Figure 3. This assessment is based on a comparison between the latest historic trends, relevant target paths (i.e. annual GHG emission targets 2013–2020 under the ESD), and projections reported by countries. A description of the data and methodology is provided in [2].

Figure 3: Progress towards 2013 and 2020 targets for EU Member States under the Effort Sharing Decision



Note: ESD — Effort Sharing Decision. ETS — Emissions Trading Scheme.

Data sources: a. EEA. National emissions reported to the UNFCCC and to the EU Greenhouse Gas Monitoring Mechanism
b. EEA. CITL v16 c. EEA. Annual European Community greenhouse gas inventory 1990–2012 and inventory report 2013
d. European Commission. Decision No 406/2009/EC

European Environment Agency

The majority of Member States expect that their individual emission targets for the non-trading sectors (under the ESD) will be met through those policy measures already in place. However, for 13 Member States (Austria, Belgium, Bulgaria, Finland, Germany, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Slovenia and Spain), current projections indicate that 2020 emissions will not be below their respective 2020 targets. Further efforts to design, adopt and implement emission-reducing policies and measures are likely to be needed along with consideration of the use of flexibility mechanisms.

Achieving the 80–95% reduction in GHG emissions by 2050 will be challenging, and anticipated reductions by European countries are still largely insufficient when compared to the just adopted 40% reduction by 2030. These figures represent what is emitted within a country's territory, calculated according to international guidelines under the UNFCCC. Countries' contributions to global emissions could be greater if imports of goods and services and their embodied emissions are taken into account.

Climate change has the potential to further exacerbate a range of other environmental, economic and societal problems. Addressing this requires full implementation of existing policy instruments. In addition, there are gains to be made in taking an integrated approach to climate and other policy areas, and this is reflected in the many national debates on how to achieve the transition towards a low-carbon and resource-efficient future. Taking an integrated approach enables the identification of measures that provide an adequate response to the climate change challenge while also aiming to sustain natural capital and ecosystem services.

Cross-country comparisons

Resource efficiency — material resource efficiency and productivity

Per capita consumption of material resources increased between 2000 and 2012 in 13 countries and decreased in 19. Significant increases were primarily due to large-scale infrastructure investments, with the largest declines related to the economic crisis and a collapse in construction activities.

Four countries have consistently been the most resource-efficient economies, with six remaining at the bottom of resource-productivity rankings, indicating opportunities for further improvements and actions.

Setting the scene

Natural resources underpin economic and social development, and over-consumption of these resources has resulted in environmental degradation and economic losses. Improving the resource efficiency of European economies and societies is essential, and this objective has been on the European environmental policy agenda for more than a decade.[1][2][3]

The SOER 2015 briefing on resource efficiency provides an overview of the status, trends and prospects at a European level. This SOER 2015 cross-country comparison focuses on material resources and uses resource productivity, the headline indicator chosen to monitor trends in resource efficiency under the Roadmap to a resource-efficient Europe.[4]

About the indicator

Resource productivity is defined as the ratio between gross domestic product (GDP) and domestic material consumption (DMC). DMC measures the total amount of materials directly used by an economy, and is defined as the annual quantity of raw materials extracted from the domestic territory, plus all physical imports minus all physical exports. It is expressed in tonnes per capita. This indicator is regularly published by Eurostat for individual countries and the EU as a whole.[5][6]

DMC does not include upstream material use related to imports and exports originating outside of the focal economy. Therefore Raw Material Consumption (RMC) has been proposed as a complementary indicator, as it better accounts for resource use embedded in trade. Modelling estimates for RMC have been produced by Eurostat for the EU-27 but are only available for a few individual countries.

Policies, targets and progress

Resource efficiency is a strategic priority of the Europe 2020 Strategy, a policy response to address a wide spectrum of important economic and environmental concerns.[7] In 2010, a flagship initiative for a resource-efficient Europe was adopted[8] and the resulting 2011 Roadmap to a resource-efficient Europe identified milestones for specific areas and almost a hundred individual actions to be taken by the European Commission and Member States.[4] One of the priority objectives of the 7th Environment Action Programme, which will guide European environment policy until 2020, is to 'turn the Union into a resource-efficient, green, and competitive low-carbon economy'.[9]

However, no targets have yet been adopted for resource use or resource efficiency at a European level. In the recent communication, Towards a circular economy: a zero-waste programme for Europe,[10] the European Commission proposed the adoption of a resource-productivity target, and it is hoped that this would provide an impetus for countries to also adopt targets. At present, only a few individual countries (e.g. Germany) have concrete and measurable targets accompanied by a deadline.[11]

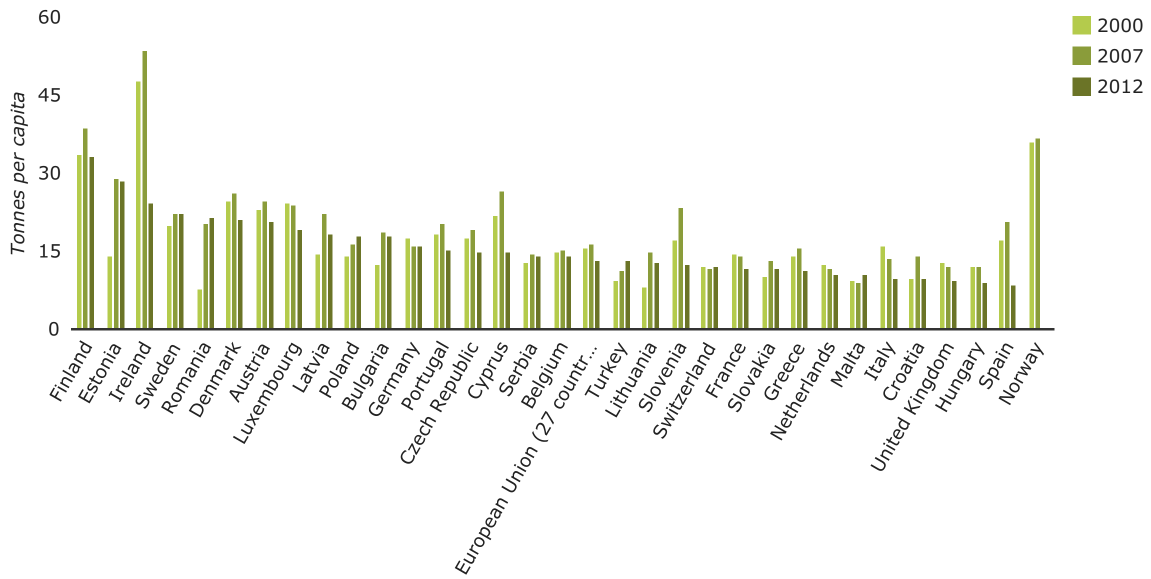
Many European countries have developed their own national programmes or strategies for resource efficiency. These initially tended to address individual topics such as energy consumption or waste recycling. However, they have gradually expanded to cover wasteful production and consumption patterns; the increasing cost of energy and raw materials; the rising global demand for raw materials; concerns over depletion of resources and the security of supply; environmental pollution; and global impacts of greenhouse-gas emissions.

A review of national initiatives shows that there is a great variety of regulatory settings and organisational arrangements in place in relation to resource-efficiency policies.[11] National policy priorities and responses are guided by EU regulations but vary widely, driven by a combination of local economic and geographic conditions, environmental priorities, and economic concerns.

The total use of material resources is strongly correlated with the population of a country and the size and structure of its economy. In 2012, the three countries with the largest total DMC were Germany, France, and Poland, while those with the lowest were Malta, Luxembourg and Cyprus.

The economic crisis that started in 2008 has been a major factor shaping trends in resource use. In individual countries and at European level, the most significant changes in resource use took place during 2007–2011 (Figure 1). In the EU-27, DMC grew from 15.6 tonnes/capita in 2000, peaked at 16.7 in 2007, before declining by 19% to the current figure of 13.7 in 2012 (Figure 1). In 2012, the countries with the highest per capita DMC were Finland, Estonia and Ireland, while the lowest were Spain, Hungary and the United Kingdom.

Figure 1: Material resource use (DMC) per capita in 32 European countries (2000, 2007 and 2012)



Note: A time series was available for 32 countries, but for four countries the full time series was not available: 2000 not available for Serbia so 2001 data are shown; latest data year for Norway was 2008; 2012 data not available for Switzerland and Turkey so 2011 data shown.

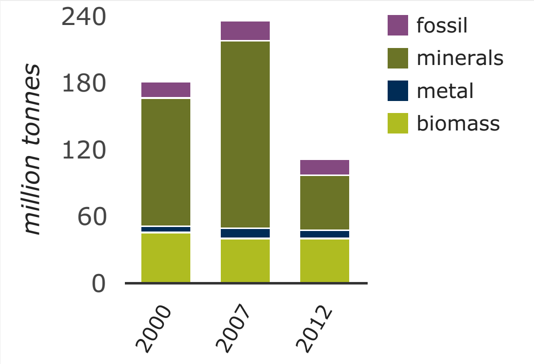
Data sources: Eurostat. Material Flow Accounts

European Environment Agency

There has been a reduction in per capita DMC in the majority of countries over the period 2000 to 2012. The largest decline was recorded in Ireland (50%) (Box 1) and Spain (49%) — mainly caused by a collapse in construction activities — followed by Italy (38%) and Cyprus (32%). Per capita DMC increased in 13 countries, and the largest per-capita increases over this period — primarily due to large-scale infrastructure investments — were recorded in Romania (178%), Estonia (104%), Lithuania (54%), Bulgaria (46%) and Turkey (44%).

Box 1: A collapse of the construction sector

Figure 2: Ireland total DMC by component (2000, 2007 and 2012)

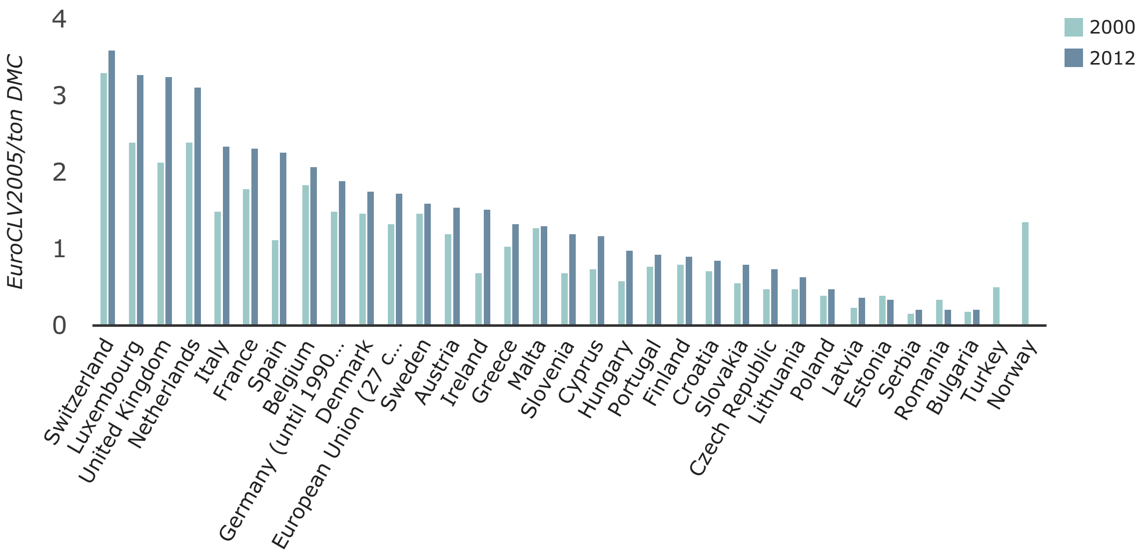


Data sources: Eurostat. Material Flow Accounts

Between 2000 and 2007, Ireland had the highest DMC per capita in the European Union, at three times the EU-27 average. This was due to the construction boom resulting in very high consumption of construction minerals (38 tonnes per capita of minerals alone in 2007 — more than twice the average **total** DMC per capita). Another contributing factor was large-scale agricultural production, resulting in the second highest DMC-biomass per capita in the EU-27 at almost 10 tonnes in 2007.

The economic decline started in 2008, and resulted in the total DMC per capita in Ireland decreasing by 55% between 2007 and 2012, with the use of construction minerals decreasing by 70%. With a DMC per capita of 24.2 tonnes in 2012, Ireland is now third-highest in the EU-27, 77% above the EU-27 average.

Figure 3: Resource productivity (GDP/DMC) in 32 European countries (2000 and 2012)



Note: A time series was available for 32 countries but for four countries the full 2000-2012 time series was not available (2000 not available for Serbia so 2001 is shown; 2011 shown for Switzerland and latest data available for Norway was 2008 and Turkey was 2010). For the calculation of resource productivity Eurostat uses the GDP in units of Euros in chain-linked volumes to the reference year 2005 at 2005 exchange rates (code: EUR_CLV05_KG).

Data sources: Eurostat. Resource productivity

Resource productivity, expressed as a ratio of GDP to DMC, links overall resource use to economic activity. Between 2000 and 2012, it increased markedly in the European Union (by 29% for the EU-27 and by 39% for the EU-15), a sign that European economies are creating more wealth out of the material resources that they use, although it also reflects changes in material use and the structure of economies.

The country with the highest resource productivity over the available time series is Switzerland. Switzerland, Luxembourg, the United Kingdom and the Netherlands have consistently been the most resource-efficient economies in Europe between 2000 and 2012. The increase in resource productivity between 2000 and 2012 was highest in Ireland, Spain, Slovenia, Hungary, the Czech Republic, Italy, Cyprus and the United Kingdom. Only two countries — Romania and Estonia — experienced a decline in resource productivity in the same period.

There are large differences amongst countries, with little evidence of convergence of resource-productivity rates between 2000 and 2012. Resource productivity is lower in the new member states and in non-EU members. This is partly due to construction sector activity, which dominates material use in many countries.

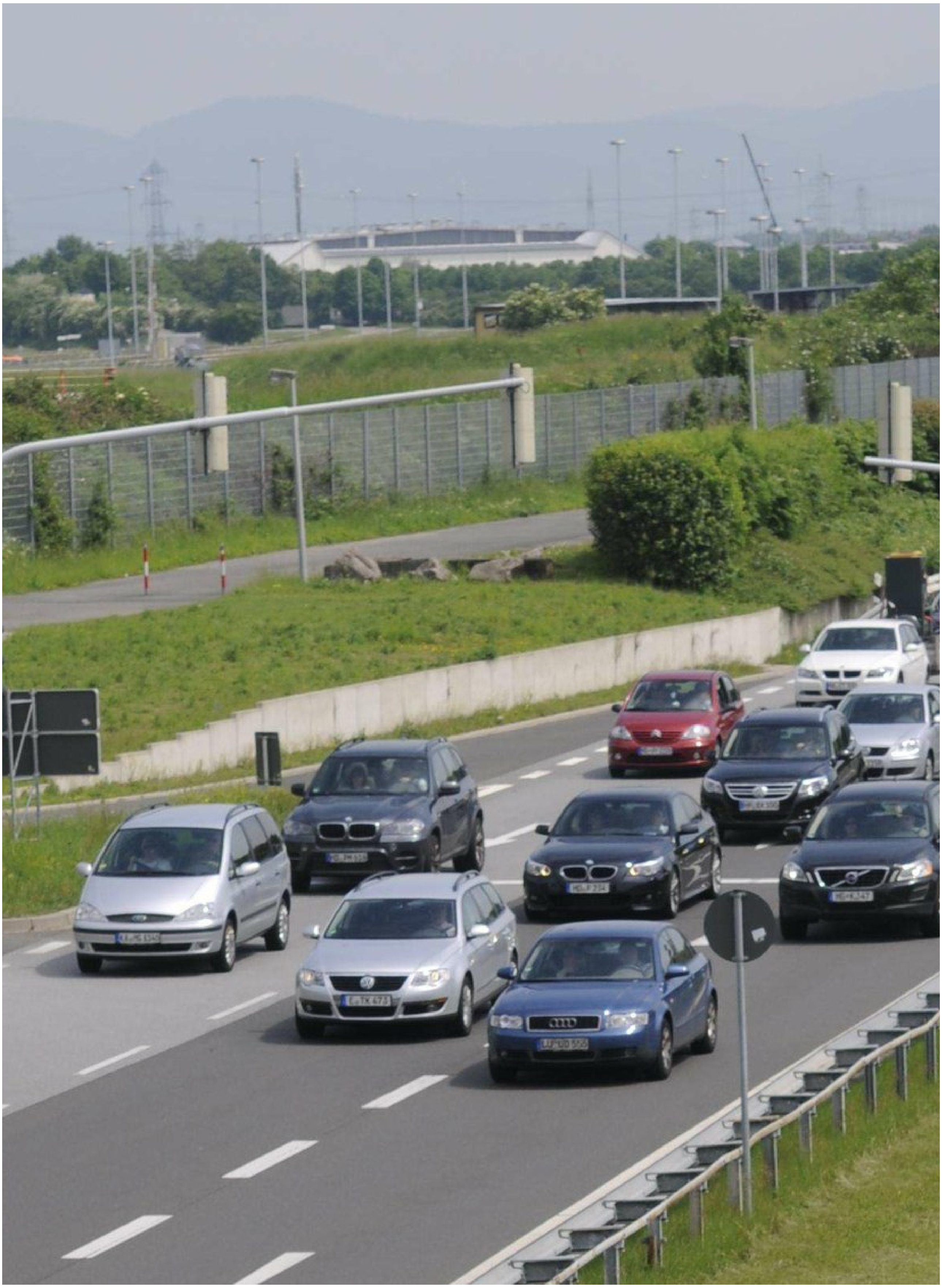
Prospects

Many factors determine resource use and productivity, including climate, population density, infrastructure needs, domestic availability of raw materials versus reliance on imports, prevailing fuel in the power generation sector, the rate of economic growth, technological development, and the structure of the economy.[12] There is also the long-term tendency for absolute amounts of resources used to increase in tandem with economic growth despite technological progress (the 'rebound' effect).

The long-term objective of current European environmental policies is that the overall environmental impact of all major sectors of the economy should be significantly reduced, and resource efficiency increased.[9] This policy goal — a double decoupling of resource use from both economic growth and environmental impacts — provides a framework and direction for national policies.[8]

The large differences in resource-efficiency performance amongst countries — and the fact that the same half-a-dozen countries have remained at the bottom of resource efficiency rankings since 2000 — indicates opportunities for improvements and actions.

Efforts to support the exchange of good practice in policy design could be one tool to facilitate faster uptake of the most effective solutions. In addition, the use of indicators such as RMC will give a broader perspective on resource productivity, incorporating upstream material use. However, the link to the overall environmental impact of resource use is still not easily captured within available indicators.



Cross-country comparisons

Transport — passenger transport demand and modal split

There was an increase in passenger transport demand between 2005 and 2012, although overall it has been stable in recent years. However, national trends varied significantly, with demand increasing in 23 countries and decreasing in 10.

In 2012, the car was the dominant mode of transport in all countries. Car passenger transport has generally decreased in the last three years (2009 to 2012) with a significant drop in some countries.

Setting the scene

Transport is fundamental to society and the economy. Passenger transport is necessary for personal mobility and access to goods and services. The accessibility and affordability of passenger transport and the amount of time spent commuting are important contributors to quality of life.[1]

Transport also contributes to a range of environmental pressures and health impacts, including greenhouse gas (GHG) emissions, poor air quality and noise levels in urban areas. Transport infrastructure contributes directly to habitat fragmentation, ecosystem degradation, and biodiversity loss. In combination with food, housing, and utilities, transport accounts for more than two thirds of the direct and indirect environmental pressures caused by household consumption.[2]

The SOER 2015 briefing on transport provides an overview of the status, trends and prospects for transport at a European level. This SOER 2015 cross-country comparison focuses on passenger transport demand and use of different transport modes.

About the indicator

The EEA publishes a range of transport indicators. The TERM (Transport and Environment Reporting Mechanism) report series provides an annual assessment of developments using a core set of indicators.[3]

The EEA indicator passenger transport demand [4] provides information on trends in volume of passenger transport, modal split and decoupling from economic growth. Passenger transport demand is defined as the volume of inland passenger-kilometres travelled every year.

Modal split is defined as the percentage share of different transport modes in total inland passenger transport. These include transport by passenger cars, buses, coaches, and trains, but do not include air travel, tram and metro, cycling, and walking due to lack of availability of comparable data. Although longer time series are available for some countries, 2005 to 2012 is used as it is the best available in terms of country coverage.

Data on passenger transport are regularly published by the European Commission as part of transport statistics. [5] Further information on methodology, quality assurance and country-specific differences is published by Eurostat.[6]

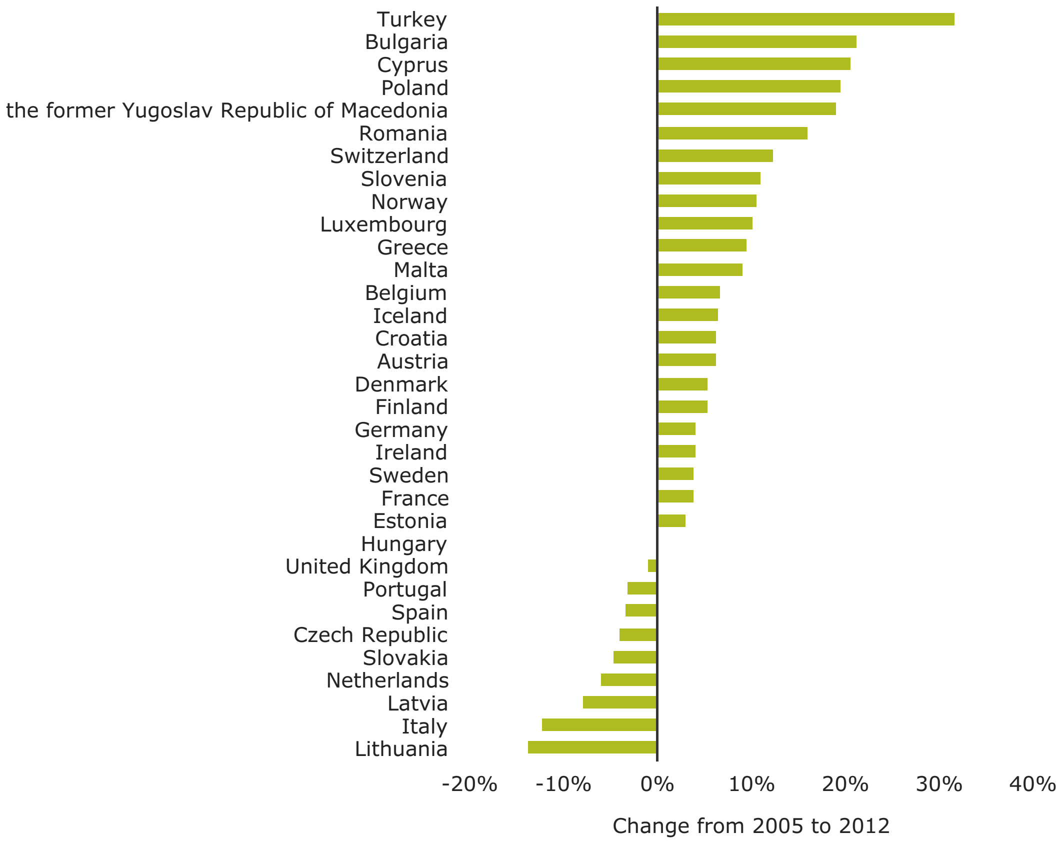
Policies, targets and progress

Transport demand has risen in recent decades and is strongly linked to economic activity. One of the objectives of European transport policy and many national policies is a decoupling of the environmental pressures and impacts from transport and economic growth. The European Commission White Paper on Transport also sets a goal of reducing CO_2 emissions from transport by at least 60% by 2050 from 1990 levels.[7]

The Roadmap to a Resource Efficient Europe has an objective to improve overall efficiency in the transport sector in order to deliver greater value in terms of optimal use of resources and reduced impacts.[8] Therefore, optimising transport demand, technological improvements, and a shift in transport modes are essential to meeting these objectives.

There was an overall increase in passenger transport demand in European countries between 2005 and 2012. Demand increased constantly until 2007–2008, but has been stable in recent years.[4] National trends varied significantly during this period, with demand increasing in 23 countries and decreasing in 10 (Figure 1). The largest percentage increases were recorded in Turkey, Bulgaria and Cyprus and the largest decreases were recorded in Lithuania, Italy and Latvia.

Figure 1: Percentage change in total passenger transport demand in 33 European countries (2005 to 2012)



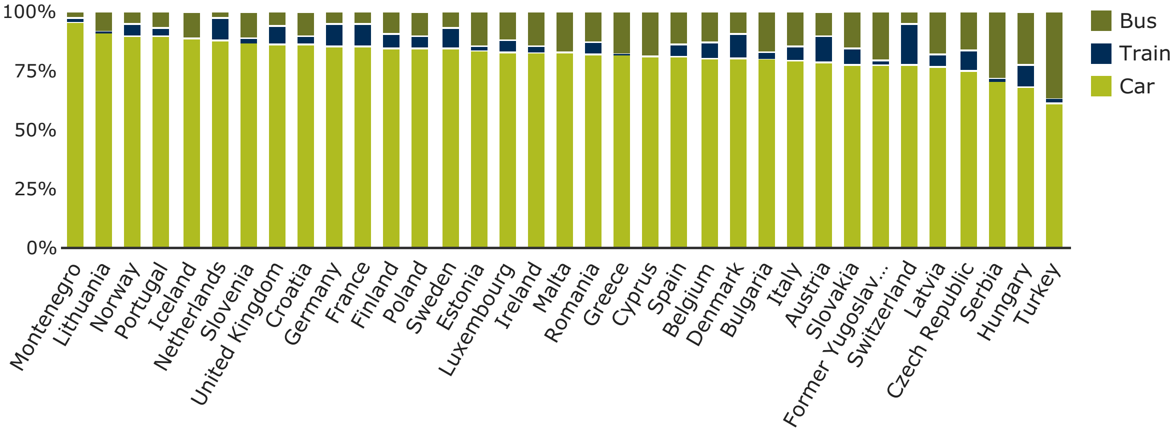
Data sources: DG Mobility and Transport. Performance of passenger transport (pkm)

European Environment Agency

As different modes of transport have differing environmental effects, it is important not just to look at trends in total demand but also to consider the modal split of transport (Figure 2).

In 2012, the car was the dominant mode of transport in all countries, comprising on average 81% of all passenger transport. The share of car transport varied from a high of 96% in Montenegro to a low of 62% in Turkey. The share of bus transport comprised on average 13% of all passenger transport, ranging from a high of 37% in Turkey to a low of around 3% in Montenegro. The average share of rail transport was around 5%, reaching a high of 17% in Switzerland.

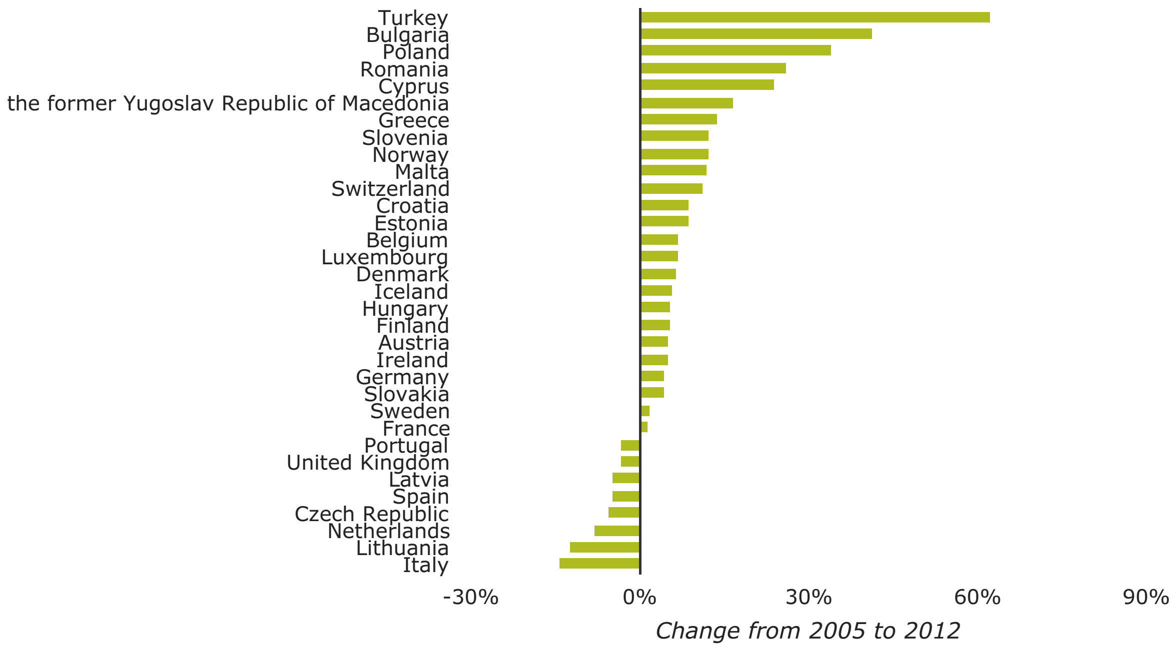
Figure 2: Modal split of passenger transport in 35 European countries in 2012



Data sources: a. Eurostat. Passenger transport modal split
b. European Commission. Statistical pocketbook 2014 Full version pdf - 2 MB [2 MB]

There have also been changes over time in the use of different modes of transport. Total car passenger-kilometres for countries as a whole increased from 2005 to 2012 by over 2%. However, national trends varied significantly, with car passenger transport increasing in 25 countries and decreasing in 8 (Figure 3). The largest increases were recorded in Turkey, Bulgaria and Poland, and the largest reductions were recorded in Italy, Lithuania and the Netherlands.

Figure 3: Percentage change in car passenger transport demand in 33 European countries (2005 to 2012)



Data sources: DG Mobility and Transport. Performance of passenger transport (pkm)

Those countries that recorded the highest increases in total passenger transport demand also recorded the highest increases in car passenger transport over the same period. Conversely, countries that recorded a decrease in total passenger transport demand also recorded a decrease in car passenger transport over the same period (with the exception of Slovakia). This highlights the dominant role of car transport in shaping overall passenger transport demand.

Prospects

Given the synergies between transport policy and a range of other areas such as climate, air pollution, biodiversity and health, there are many benefits to be gained from more sustainable passenger transport. Meeting short-term and particularly long-term goals (see [9] for an overview) will require the establishment of new transport patterns in which the greatest number of passengers are carried by the most efficient combination of modes.

Establishing new transport patterns will require systemic change, as improving the energy efficiency of vehicles will not be enough on its own. Changing the mobility system requires a combination of a new concept of mobility, technologies, and more sustainable behaviour. Changes can take time to implement, as opportunities and developments are influenced by the infrastructure and vehicle fleet already in place. There is evidence of public recognition of the damage caused by current travel patterns and of the need for change. Europeans consider the use of public transport to be one of the top three priorities for protecting the environment, and they report using their cars less and choosing more environmentally-friendly ways of travelling.[10]

European countries have implemented a range of measures and initiatives aimed at minimising the impacts of transport, which include reducing the need for travel and supporting modal shifts. One important contribution to optimising demand will be ensuring the external costs of transport are internalised. This is particularly true in the case of road transport, for which there is increasing evidence that the costs of climate change, air and noise pollution, and health impacts outweigh existing taxes and charges.[3]

In relation to passenger transport, increasing vehicle occupancy through car sharing can reduce overall car transport. The development of high speed rail linking major cities can encourage passengers on long journeys to shift from car to rail. EU-15 Member States have invested heavily in high speed rail since 2000, increasing track capacity by 150% and passenger-kilometres by almost 80%.[4] Public bicycle hire schemes can encourage passengers on shorter journeys to also shift away from car use.[9] The TERM 2014 report provides further country specific information on passenger transport with a focus on long distance transport.[11]

While European policy sets a common framework and shared goals, national and local action is essential to achieving many of these. The variability in trends in passenger transport demand across European countries highlights the potential for greater understanding of the underlying drivers and potential barriers to change. This could be combined with exchange of good practices to facilitate faster uptake of effective measures and initiatives such as the development of Sustainable Urban Mobility Plans for European cities.

Understanding of trends in passenger transport demand would also be improved with better information on vehicle occupancy rates, complementing data on passenger-kilometres with vehicle-kilometres. This would enable determination of what share of the trends observed in overall distance travelled is caused by changes in the average number of passengers in the vehicle. Improved country coverage for data on non-motorised modes of transport would also provide better information on the shift towards more sustainable transport modes across Europe.

Cross-country comparisons

Waste — municipal solid waste generation and management

Generation of municipal waste per capita has declined slightly from 2004 to 2012, but it is clearly better managed now than ten years ago.

The number of countries recycling and composting more than 30% of municipal waste increased from 11 to 17 out of 35, and those landfilling more than 75% of their municipal waste declined from 11 to 8.

The large differences in performance indicate room for further improvement and actions to meet the 2020 target to recycle 50% of municipal waste.

Setting the scene

Municipal waste management in European countries has evolved over the last two decades from a focus on disposal methods to a greater focus on prevention and recycling. Moving municipal waste management up the 'waste hierarchy' (i.e. waste prevention, preparing for reuse, recycling, recovery and disposal) is a key way of extracting more value from resources while reducing the pressures on the environment and creating jobs. However, while progress has been made, 'resource use is still largely unsustainable and inefficient, and waste is not yet properly managed'.[1] The SOER 2015 briefing on waste provides an overview of the status, trends and prospects on waste generation and management at a European level.

This SOER 2015 cross-country comparison focuses on municipal solid waste (referred to as municipal waste). Although municipal waste only represents around 10% of total waste, it is very visible and has a diverse composition linked to consumption patterns. Countries that have developed efficient municipal-waste management systems generally perform better in overall waste management.[2]

About the indicators
Limitations of available data and indicators introduce an element of uncertainty when comparing across countries and over time. There are differences in definitions of municipal waste, the waste types included in reported data, and even differing methodologies for data processing. For example, some countries only include waste from households whereas others include similar wastes from commercial activities and offices. Therefore a country that includes more waste types (e.g. garden, packaging and bulky wastes) in municipal waste will appear to generate more municipal waste per capita than one that excludes these.

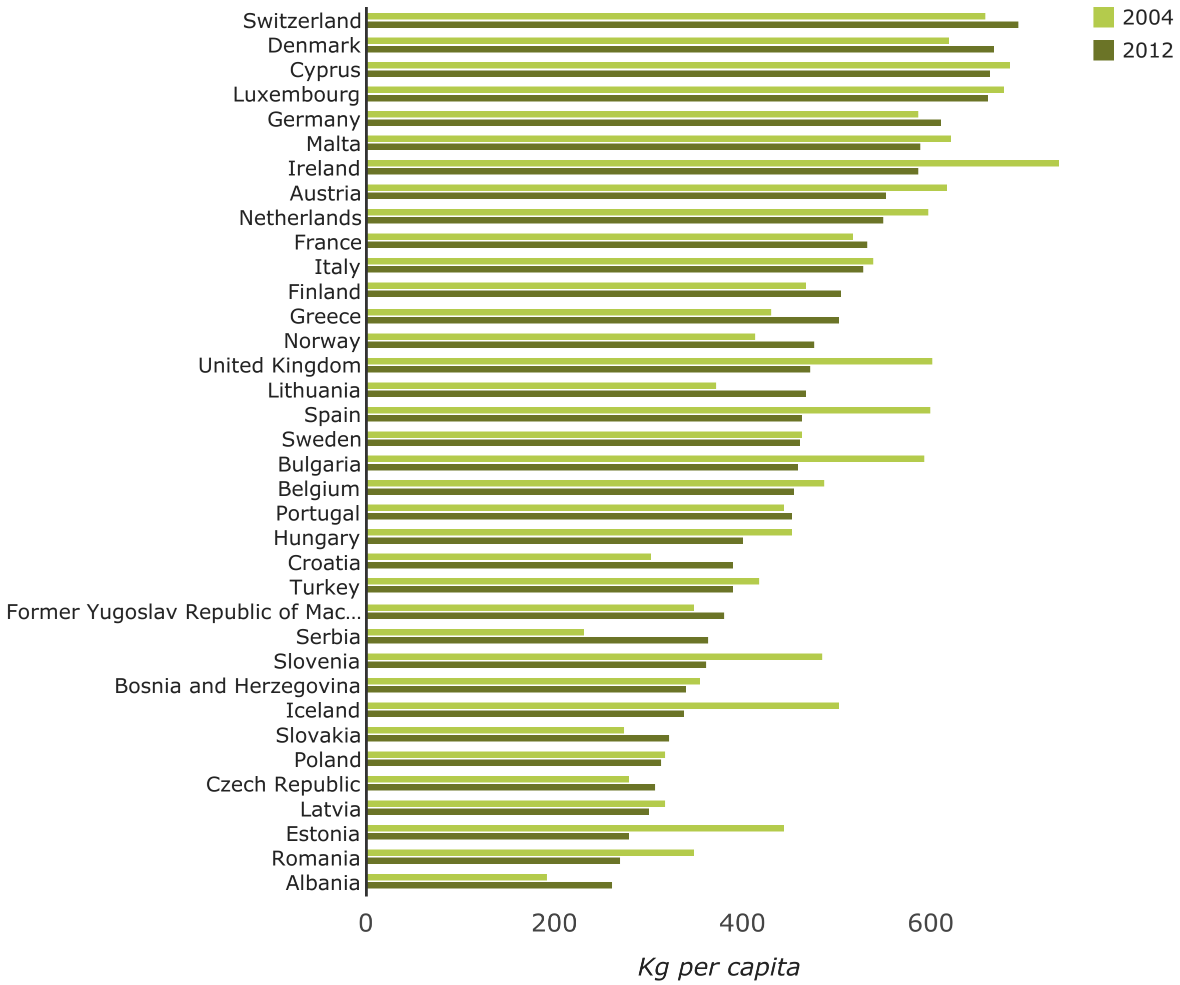
Countries have also changed their definition of municipal waste over time, and some reported the amount collected rather than generated. Countries can also choose between four different methods to monitor recycling rates.[3] Recycling rates can also be calculated differently depending on whether the weight of materials collected but discarded during the recycling process is included or not.

However, the indicators used in this assessment (municipal waste generated per capita, municipal waste recycled, and municipal waste sent to landfill) are currently the best available, and the calculation of recycling rates follows the most demanding method, which is used consistently in this assessment (see EEA Report No 2/2013 for further details).

Policies, targets and progress

Multiple waste policies and targets set at European level include minimum requirements for managing certain waste types. The most relevant targets for municipal waste are the Landfill Directive's landfill-diversion targets for biodegradable municipal waste; the Packaging and Packaging Waste Directive's recycling targets; and the Waste Framework Directive's recycling target for household and similar wastes.[4] Total municipal waste generation in the EEA countries declined by 1% in absolute terms and by 4% per capita from 2004 to 2012. However, there has been no uniform trend across countries, with an increase in municipal waste generation per capita in 15 — and a decrease in 20 — out of 36 countries for which data are available (Figure 1).

Figure 1: Municipal waste generated per capita in 36 European countries (2004 and 2012)



Note: 2005 data used instead of 2004 for Poland due to changes in methodology. Due to data availability instead of 2004 data, 2008 data were used for Bosnia and Herzegovina; 2006 data used for Serbia; and 2008 data used for the Former Yugoslav Republic of Macedonia.

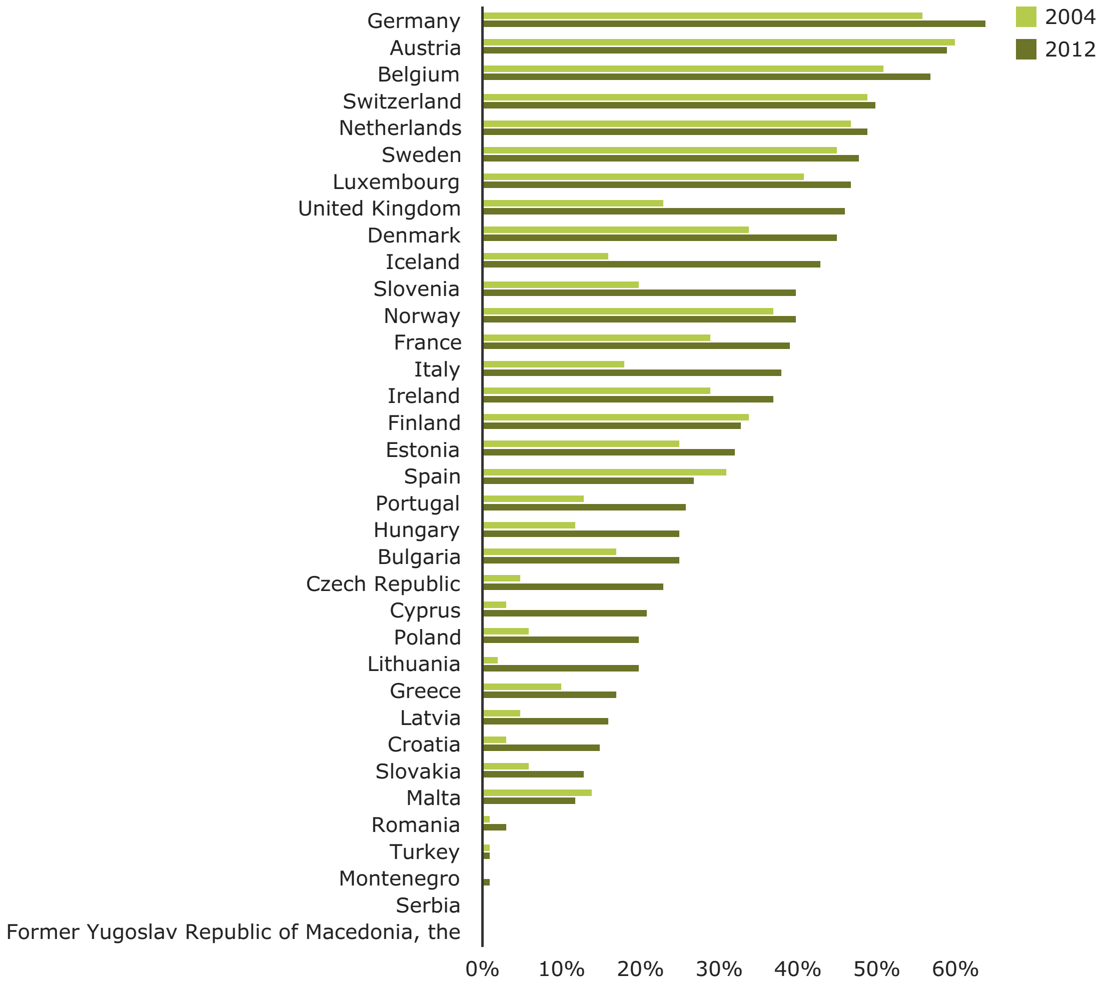
Data sources: a. Eurostat. Municipality waste statistics
b. Eurostat. Demography national data population Population on 1 January by age and sex

European Environment Agency

In 2012, municipal waste generation per capita was highest in Switzerland (694 kg/capita), Denmark (668 kg/capita) and Cyprus (663 kg/capita), and lowest in Romania (271 kg/capita) and Albania (262 kg/capita). This reflects differences in data, economic wealth between countries (wealthier countries usually generate more municipal waste per capita), and the recent economic downturn.

The Waste Framework Directive[5] sets a target for 50% of municipal waste (more precisely the target applies to specific types of household and similar wastes) to be recycled by 2020 in individual countries (except Turkey and Switzerland). One of the success stories of environmental policy in Europe so far is the increase in the rates of municipal waste recycling (covering material recycling, composting and digestion of bio-wastes). Countries achieved an average recycling rate of 29% in 2012, compared to 22% in 2004. Although this reflected only very modest improvements in recycling of bio-waste.

Figure 2: Municipal waste recycling in 35 European countries (2004 and 2012)



Note: Note: The recycling rate is calculated as the percentage of municipal waste generated that is recycled and composted. Changes in reporting methodology means that 2012 data are not fully comparable with 2004 data for Austria, Cyprus, Malta, Slovakia and Spain. 2005 data used instead of 2004 for Poland due to changes in methodology. Due to data availability instead of 2004 data, 2003 data were used for Iceland; 2007 data used for Croatia; and 2006 data used for Serbia. For the former Yugoslav Republic of Macedonia, 2008 data were used for 2004, and 2011 used for 2012.

Data sources: Eurostat. Municipality waste statistics

European Environment Agency

There were large differences in performance amongst those countries with the highest and lowest recycling rates (Figure 2). Germany, Austria, Belgium and Switzerland recycled more than half of their municipal waste in 2012. The highest increase in recycling rates between 2004 and 2012 occurred in Iceland, the United Kingdom, Italy, Slovenia, Lithuania, Cyprus and the Czech Republic (18–25 percentage points). Overall, in 14 out of 35 countries, the increase in recycling rates exceeded 10 percentage points over this period. However, in six countries the share of recycled municipal waste barely changed (Austria, Finland, Serbia, the Former Yugoslav Republic of Macedonia, Montenegro and Switzerland). Recycling rates decreased in three countries, Malta, Turkey and Spain.

There is a clear link between increasing recycling rates and declining rates of landfilling. In countries with high municipal waste-recycling rates, landfilling declines much faster than the growth in recycling, as waste management strategies usually move from landfill towards a combination of recycling and incineration, and in some cases also Mechanical-Biological Treatment (MBT).[4]

The rate of municipal waste landfilling for the EU-27 went down from 47% in 2004 to 33% in 2012. The performance of individual countries varied. In Austria, Denmark, Norway, the Netherlands, Belgium, Sweden and Germany, virtually no municipal waste is sent to landfill. Whereas Lithuania, Cyprus, Romania, Greece, Malta, Croatia, Turkey and Latvia landfill more than three quarters of their municipal waste.

Overall, the rates of landfilling have decreased in 27 out of 31 countries for which data are available. Between 2004 and 2012, the largest decreases occurred in Poland (35 percentage points), the United Kingdom (33 percentage points), and Estonia (28 percentage points). The EEA has also published factsheets on municipal waste management in 34 EEA member and cooperating countries.

Prospects

The majority of countries are making progress on diverting waste from landfill, thus moving municipal waste management up the waste hierarchy. The outlook for reaching the 50% recycling target for municipal waste by 2020 is mixed. This level of recycling has already been achieved by four countries, with another nine countries on track if they maintain the same rate of progress as recorded between 2001 and 2012.

However, the majority of the countries will have to step up their efforts in order to reach the target. Nine countries will have to increase recycling rates by 2–4 percentage points annually, while six countries need to achieve an unprecedented increase of more than 4 percentage points annually.[4]

Almost without exception, the better-performing countries in terms of recycling have a wider range of measures and instruments in place than poorer-performing countries. Measures include landfill bans on biodegradable waste or non-pre-treated municipal waste; mandatory separate collection of municipal waste types, especially biowastes; and economic instruments such as landfill and incineration taxes and waste collection fees that strongly encourage recycling. Although the key drivers behind better municipal waste management are clearly EU and national policies and targets, regional and local policies within countries also play a significant role in the process.[4][6]

The Waste Framework Directive required countries to establish national waste prevention programmes by December 2013. The effects of the programmes are yet to be seen in most countries, and it is premature to link declines in waste generation with their implementation and effectiveness. A clearer picture will emerge as the annual EEA review of national waste-prevention programmes progresses.[7] Turning waste into a resource will require full implementation of waste legislation and additional efforts to reduce waste generation in absolute terms, removal of barriers to recycling, and limiting landfill to residual (i.e. non-recyclable and non-recoverable) waste.[1]

Improvements in waste data and harmonisation of national reporting methodologies are required, as uncertainties relating to the comparability of national data is a barrier to assessment of progress and the effectiveness of policy measures. The legislative proposal to change the Waste Framework Directive, which also includes a review of targets for municipal and packaging waste,[2] will assist in this regard.

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