12 Environment

The sixth environment action programme (sixth EAP) [1], adopted in 2002, is the EU's ten-year (2002-2012) policy programme for the environment. It identifies four key priorities:

- tackling climate change: to achieve the EU's target of reducing greenhouse gas emissions by 8 % by 2008-2012;
- nature and biodiversity: to avert the loss of species and their habitats in Europe by completion of the Natura 2000 network and by developing new sectoral biodiversity action plans, and to pay greater attention to protecting landscapes, the marine environment and soils, and to establish measures to prevent industrial and mining accidents;
- environment and health: to completely overhaul the EU's risk-management system for chemicals, to develop a strategy for reducing risks from pesticides, protection of water quality in the EU, noise abatement and a thematic strategy for air quality;
- sustainable use of natural resources and the management of waste: to increase resource efficiency and decouple resource use from economic growth, to increase recycling and waste prevention with the aid of an integrated product policy and measures targeting specific waste streams such as hazardous waste, sludges and biodegradable waste.

In order to implement the sixth EAP, the European Commission adopted seven thematic strategies; these are air pollution (adopted in September 2005), marine environment (October 2005), the prevention and recycling of waste (December 2005), the sustainable use of natural resources (December 2005), urban environment (January 2006), soil (September 2006) and the sustainable use of pesticides (July 2006).

(1) Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme; http://europa.eu/eur-lex/pri/en/oj/dat/2002/l_242/l_24220020910en00010015.pdf.

Each strategy follows an in-depth review of existing policy and wide-ranging stakeholder consultation. The aim is to create positive synergies between the seven strategies, as well as to integrate them with existing sectoral policies, the revised Lisbon strategy and the sustainable development strategy.

A 2007 mid-term review of the sixth EAP [2] was held and results adopted by the European Commission in April 2007: this confirmed the programme as the framework for Community action in the field of the environment up to 2012. The EU also set a target for more radical global emission cuts in the order of 20 % by 2020.

Eurostat, in close partnership with the European Environment Agency (EEA), provides statistics, indicators and meta-information on environmental pressures and the state of the environment to support the implementation and monitoring of the sixth EAP.

12.1 Climate change

Introduction

The fourth assessment report from the International Panel on Climate Change (IPCCC) confirmed that climate change exists and is projected to continue; the emission of greenhouse gases from human activities, such as the burning of coal, oil and gas, is causing an overall warming of the earth's atmosphere, and climate change is the most likely result with potentially major economic and social consequences [3].

Data on greenhouse gas emissions are officially reported under the United Nations Framework Convention on Climate Change – UNFCCC [4] – and the Kyoto Protocol. The so-called Kyoto basket includes six greenhouse gases (GHG): carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

Under the Kyoto Protocol, the European Community has agreed to an 8 % reduction in its greenhouse gas emissions by 2008-2012, compared with a base year which in general terms is 1990. The reductions for each of the EU-15 Member States have been agreed under the so-called EU burden sharing agreement, which allows some countries to increase emissions, provided these are offset by reductions in other Member States. The ten Member States that joined the EU in 2004, as well as Bulgaria and Romania, have chosen other reduction targets and other base years as allowed under the protocol. Emissions of the six greenhouse gases

(2) Commission Communication on the mid-term review of the Sixth Community Environment Action Programme, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52007SC0547:EN:HTML.

(3) 'Winning the battle against global climate change', COM(2005) 35; http://ec.europa.eu/environment/climat/pdf/comm_en_050209.pdf.

(4) http://unfccc.int.

covered by the protocol are weighted by their global warming potentials (GWPs) and aggregated to give total emissions in CO_2 equivalents.

In February 2006, the European Commission adopted the fourth national communication [5] from the European Community under the UNFCCC, in which it describes the wide range of policies on climate change, provides projections for greenhouse gas emissions, and outlines the effect of European Community policies and measures on such gases. In August 2006, the European Commission adopted a communication implementing a Community strategy to reduce CO_2 emissions from cars [6].

In January 2007, the European Commission set out proposals and options for an ambitious global agreement in its Communication 'Limiting Global Climate Change to 2 degrees Celsius: The way ahead for 2020 and beyond', proposing a number of EU targets for 2020:

- greenhouse gas emissions should be cut by 20 % compared with 1990 levels;
- renewable energy sources (such as hydro, solar and wind energy) should provide 20 % of all energy used;
- biofuels should account for 10 % of all transport fuels; and
- total energy consumption should be cut by 20 % through increased energy efficiency.

At their spring European Council in March 2007, EU Heads of State and Government pledged that the EU would reduce its emissions in the order of 30 % below 1990 levels by 2020 provided that other developed countries agreed to make similar efforts. EU leaders endorsed the package of climate and energy measures put forward by the Commission as the basis for achieving this goal.

In January 2008, the Commission proposed a major package [7] of climate and energy-related legislative proposals to implement these commitments and targets, which (at the time of writing) are being discussed by the European Parliament and the Council.

Definitions and data availability

The European Environment Agency, assisted by its European Topic Centre on Air and Climate Change, compiles the annual European Community greenhouse gas inventory report for submission to the UNFCCC Secretariat.

Emissions data for the six greenhouse gases (GHG): CO_2, CH_4, N_2O, HFC, PFC and SF_6 are weighted by their global warming potentials (GWPs) and aggregated to give total emissions in CO_2-equivalents. To obtain emissions in CO_2-equivalents using their global warming potential, the following weighting factors are used: carbon dioxide=1, methane=21, nitrous oxide=310 and sulphur hexafluoride=23 900. Hydrofluorocarbons and perfluorocarbons comprise a large number of different gases that have different GWPs.

Land use changes and forestry are excluded from the calculations of GHG emissions. The base quantity is defined by the GHG emissions in the base year, which is 1990 for the non-fluorinated gases (CO_2, CH_4 and N_2O) and 1995 for

(5) COM(2006) 40; http://unfccc.int/resource/docs/natc/eunce4.pdf.

(6) COM(2006) 463; http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006_0463en01.pdf.

(7) COM(2008) 30 final on '20 20 by 2020 – Europe's climate change opportunity'; http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52008DC0030:EN:NOT.

the fluorinated gases (HFC, PFC and SF_6), with exceptions for some countries. Greenhouse gas emission reduction targets for 2008-2012 are those agreed upon in Council Decision 2002/358/EC (for the Member States) or in the Kyoto Protocol (all other countries).

Main findings

Total greenhouse gas (GHG) emissions across the EU-27 declined by 7.7 % between 1990 and 2006, although most of this decline took place in the period before 1998. Indeed, the EU-27's GHG emission levels for 2006 remained 1.5 % higher than the relative low recorded in 2000.

Developments among Member States varied considerably: of the twelve Member States where GHG emission levels in 2006 were higher than in 1990, by far the strongest rises (45 % to 70 % higher) were recorded for Cyprus, Spain and Malta. In comparison to the Kyoto targets set for the 2008-2012 period (note that targets were not set for Cyprus and Malta), GHG emission levels in 2006 were relatively high in Spain, Luxembourg, Austria and Denmark –where emissions also remained above 1990 levels.

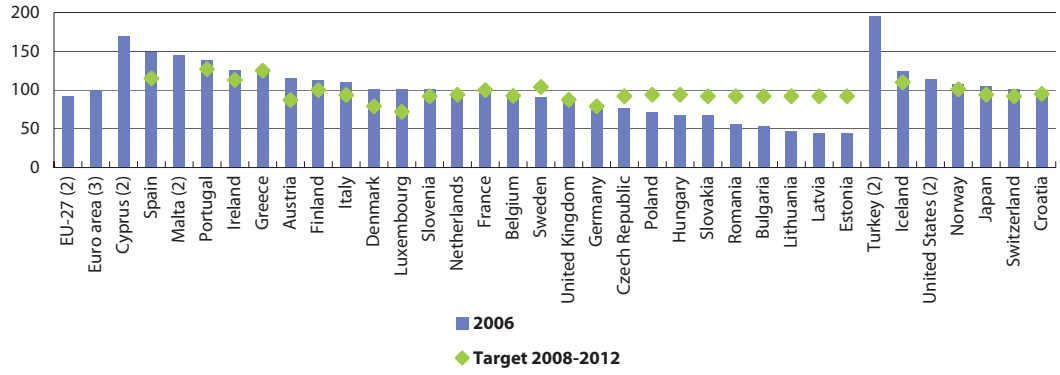
In contrast, GHG emissions in 2006 were lower than 1990 levels in 15 of the Member States, with some of the largest reductions being recorded among the three Baltic Member States, where emissions fell by more than 50 % to be well within their respective Kyoto targets.

Greenhouse gas emissions rose by the equivalent of 77.6 million tonnes of CO_2 between 2000 and 2006 in the EU-27. In absolute terms, the largest rises in GHG emissions in this period came from Spain (48 million tonnes), Romania (18 million tonnes) and Italy (16 million tonnes). In contrast, there were notable falls recorded in the United Kingdom (18 million tonnes), Germany (15 million tonnes), France (14 million tonnes, which was almost entirely in 2006) and Belgium (9 million tonnes).

A majority (60.4 %) of the EU-27's GHG emissions in 2006 came from energy (excluding transport). Compared with the situation in 1990, however, a much greater proportion (19.3 % compared with 14.0 %) of GHGs came from transport. The relative shares of GHG emissions from other sectors decreased; in the case of energy this was in part explained by a reduction in the use of coal, and in the case of agriculture by a lower use of fertilisers and pesticides.

The latest projections suggest that in order for the EU to reach its intended targets for 2020, it will have to put emissions on a much steeper reduction path after 2012.

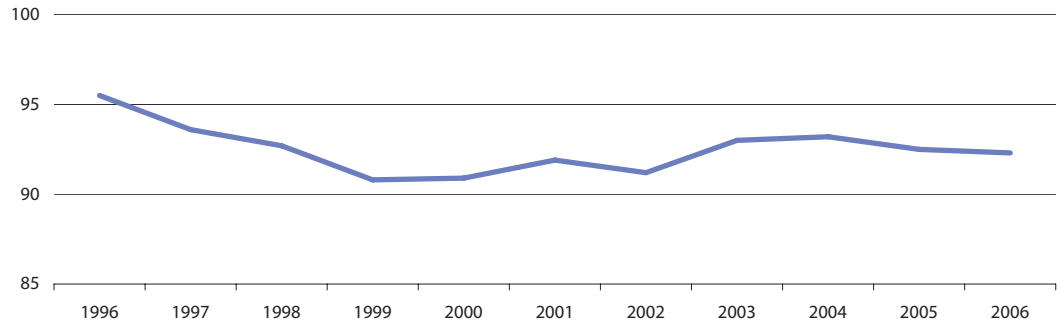
Figure 12.1: Total greenhouse gas emissions (1)
(base year=100; for EU-27, Cyprus and Malta, 1990=100)



(1) Generally index based on 1990=100.
(2) No target under the Kyoto Protocol.
(3) EA-12 instead of EA-15; no target under the Kyoto Protocol.

Source: Eurostat (tsien010), European Environment Agency, European Topic Center on Air and Climate Change

Figure 12.2: Greenhouse gas emissions, EU-27 (1)
(1990=100)



(1) Weighted emissions of greenhouse gases represented 5 320 million tonnes of CO_2 equivalent in 1996 and 5 143 million tonnes in 2006.

Source: Eurostat (tsien010 and ten00072), European Environment Agency, European Topic Center on Air and Climate Change

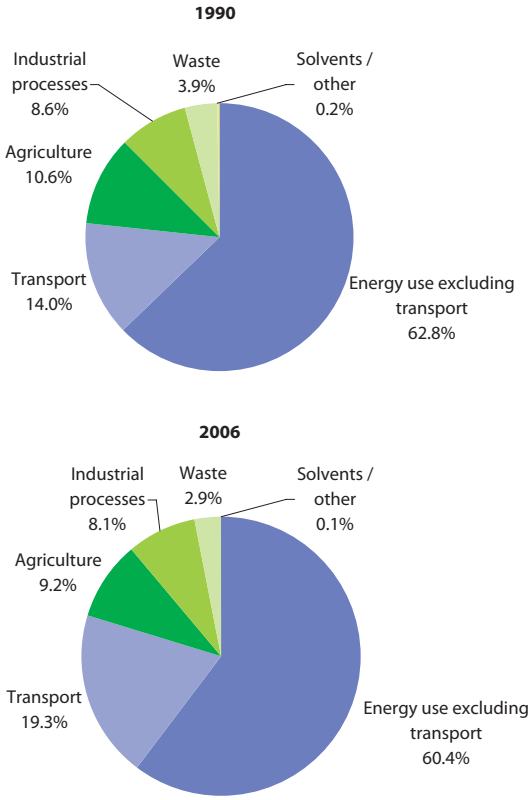
Table 12.1: Greenhouse gas emissions

	Total greenhouse gas emissions (1990=100) (1)				Weighted emissions of greenhouse gases (million tonnes of CO_2 equivalent)			
				Target 2008				Share in
	1996	2001	2006	2012	1996	2001	2006	EU-27 (%)
EU-27	95.5	91.9	92.3	:	5 319.5	5 121.2	5 142.8	-
Euro area	99.3	100.3	100.6	:	3 325.5	3 356.4	3 367.3	65.5
Belgium	106.0	99.6	94.0	92.5	154.5	145.2	137.0	2.7
Bulgaria	65.0	52.0	53.8	92.0	86.2	69.0	71.3	1.4
Czech Republic	82.2	76.7	76.3	92.0	159.6	149.0	148.2	2.9
Denmark	129.1	100.2	101.7	79.0	89.5	69.4	70.5	1.4
Germany	90.4	84.1	81.5	79.0	1 114.7	1 036.3	1 004.8	19.5
Estonia	50.8	42.9	44.3	92.0	21.7	18.3	18.9	0.4
Ireland	110.4	127.2	125.5	113.0	61.4	70.7	69.8	1.4
Greece	106.5	121.1	124.4	125.0	113.9	129.6	133.1	2.6
Spain	107.4	133.0	149.5	115.0	311.3	385.5	433.3	8.4
France	101.3	98.9	96.0	100.0	571.3	557.6	541.3	10.5
Italy	101.3	108.0	109.9	93.5	523.4	558.0	567.9	11.0
Cyprus	125.3	142.1	170.1	:	*7.4*	*8.4*	10.0	0.2
Latvia	48.5	41.1	44.9	92.0	12.6	10.7	11.6	0.2
Lithuania	47.1	41.2	47.0	92.0	23.3	20.3	23.2	0.5
Luxembourg	79.2	79.6	101.2	72.0	10.4	10.5	13.3	0.3
Hungary	70.6	68.8	68.1	94.0	81.5	79.4	78.6	1.5
Malta	119.7	129.3	145.0	:	*2.6*	*2.8*	3.2	0.1
Netherlands	108.9	101.1	97.4	94.0	232.0	215.3	207.5	4.0
Austria	105.9	107.9	115.2	87.0	83.7	85.3	91.1	1.8
Poland	79.6	68.4	71.1	94.0	448.4	385.5	400.5	7.8
Portugal	112.8	138.7	138.3	127.0	67.8	83.4	83.2	1.6
Romania	68.3	51.7	56.3	92.0	190.0	143.7	156.7	3.0
Slovenia	95.0	97.4	101.2	92.0	19.4	19.8	20.6	0.4
Slovakia	71.1	69.7	67.9	92.0	51.2	50.2	48.9	1.0
Finland	108.8	105.6	113.1	100.0	77.3	75.0	80.3	1.6
Sweden	107.2	95.6	91.1	104.0	77.3	69.0	65.8	1.3
United Kingdom	93.7	86.7	84.0	87.5	727.2	673.3	652.3	12.7
Croatia	72.4	84.2	94.8	95.0	23.5	27.4	30.8	-
Turkey	142.4	154.1	195.1	:	0.2	0.3	0.3	-
Iceland	96.3	109.1	124.2	110.0	3.3	3.7	4.2	-
Liechtenstein	86.8	86.8	:	92.0	0.0	0.0	0.0	-
Norway	106.2	110.1	107.7	101.0	52.8	54.7	53.5	-
Switzerland	98.1	99.6	100.8	92.0	51.8	52.6	53.2	-
Japan	106.8	104.0	105.3	94.0	1 358.2	1 322.7	1 340.8	-
United States	109.3	112.5	114.4	:	6 706.6	6 901.4	7 107.3	-

(1) Generally index based on 1990=100; EU-27, Cyprus, Malta, Turkey and the United States, no target under the Kyoto Protocol.

Source: Eurostat (tsien010 and ten00072), European Environment Agency, European Topic Center on Air and Climate Change

Figure 12.3: Greenhouse gas emissions by sector, EU-27, 2006 (1)
(%, based on data in million tonnes CO_2 equivalent)



(1) Total emissions were 5 143 million tonnes of CO_2 equivalent for the EU-27; figures do not sum to 100 % due to rounding.

Source: Eurostat (env_air_emis), European Environment Agency

12.2 Air pollution

Introduction

Data on air pollution is officially reported under the Convention on Long-range Transboundary Air Pollution – CLRTAP – to the EMEP project; EMEP stands for Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air pollutants in Europe. The air pollutants that are reported are ammonia (NH_3), sulphur oxides (SO_2 and SO_3 as SOx), nitrogen oxides (NO and NO_2 as NOx), non-methane volatile organic compounds (NMVOC), carbon monoxide (CO), and particulate matter (PM10, particles defined as having aerodynamic diameter of 10 μm or less). Where PM10 data are not reported by countries to EMEP/CLRTAP, emission estimates can be obtained from the Regional Air Pollution Information and Simulation (RAINS) model.

Air pollution caused by human activities, the rise of industrial and energy production, the burning of fossil fuels and increased transport can lead to serious health problems. Air pollution damages the health of hundreds of thousands of Europeans every year. A 2004 WHO evaluation found that air pollution contributed to 100 000 premature deaths and 725 000 working days lost annually in Europe.

Since the early 1970s, the EU has been working to improve air quality by controlling emissions of harmful substances into the atmosphere, improving fuel quality, and by integrating environmental protection requirements into the transport and energy sectors. In 2008, a new Directive [8] of the European Parliament and of the Council regarding ambient air quality and cleaner air for Europe was adopted and came in to force. There was also a 2008 Directive [9] of the Council concerning integrated pollution prevention and control of stationary source emissions.

Although ozone (O_3) is present in small concentrations throughout the atmosphere, most ozone (about 90 %) exists in the stratosphere, a layer between 10 and 50 km above the surface of the earth. This ozone layer performs the essential task of filtering out most of the sun's biologically harmful ultraviolet (UV-B) radiation. At ground level, ozone is harmful. It is formed by atmospheric pollutants and is often associated with human activities, such as the burning of fossil fuels and biomass, traffic emissions, or the use of aerosols, while natural events, such as volcanic eruptions, can also have an impact. Areas with heavy traffic are particularly susceptible to the formation of ground level ozone; this problem is exacerbated by particular climatic conditions. Ground level ozone is a secondary pollutant caused by nitrogen oxide and volatile organic compounds reacting in sunlight; it harms human health, nature and biological diversity, crops and materials. People living in urban areas are therefore most at risk from ground level ozone. Higher concentrations of ground level ozone can have harmful effects on the respiratory tract, can cause breathing difficulties, damage lungs and can trigger asthma attacks.

(8) Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008; http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0050:EN:NOT.

(9) Directive 2008/1/EC of the Council of 15 January 2008; http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0001:EN:NOT.

Indeed, human health is also at risk from high concentrations of particles, particularly those smaller than 10 µm, which penetrate deeply into the lungs, increasing the death rate in members of the population suffering from heart and lung diseases. Particles smaller than 2.5 µm are mostly soot, especially wood smoke and diesel-engine exhaust. These can persist in the air for long periods and can be transported over long distances. Coarser particles (soil and mineral ash) originate mainly from mechanical processes such as mining, quarrying and other industrial processes, as well as wear and tear of tyres and brakes in road traffic.

Definitions and data availability

The European Environment Agency (EEA) and its European Topic Centre on Air and Climate Change compile data on emissions of air pollutants and on air quality for the Member States and the candidate countries. A near to real-time ozone information system is available on the EEA website [10].

Emissions of key air pollutants are available in EPER, a web-based register, which enables the public to view data from large industrial point sources in the EU [11].

Urban population exposure to air pollution shows the population weighted annual mean concentration of particulate matter and yearly sum of maximum daily 8-hour mean ozone concentrations above a threshold (70 microgram ozone per m^3) at urban background stations in agglomerations and the . **Fine particulates** (PM10), i.e. particulates whose diameter is less than 10 micrometers, can be carried deep into the lungs where they can cause inflammation and a worsening of the condition of people with heart and lung diseases. In 1996, the Environment Council adopted Framework Directive 96/62/EC on ambient air quality assessment and management. The first Daughter Directive (1999/30/EC) relating to limit values for PM10 and other pollutants in ambient air fixed an annual limit value of 40 microgram of PM10 per m^3. Annual reporting must follow Commission Decision 2004/224/EC of 20 February 2004 laying down arrangements for the submission of information under Council Directive 96/62/EC in relation to limit values for certain pollutants in ambient air. **Ozone** is a strong photochemical oxidant, which causes serious health problems and damage to the ecosystem, agricultural crops and materials. Human exposure to elevated ozone concentrations can give rise to inflammatory responses and decreases in lung function. In 1996, the Environment Council adopted Framework Directive 96/62/EC on ambient air quality assessment and management. The third Daughter Directive (2002/3/EC) relating to ozone was adopted on 12 February 2002 with a long-term objective of 120 microgram ozone per m^3 as a maximum daily 8-hour mean within a calendar year. The annual reporting must follow the Commission Decision 2004/224/CE of 20 February 2004 laying down arrangements for the submission of information under Council Directive 96/62/EC in relation to limit values for certain pollutants in ambient air.

(10) Ozone today – European status; http://www.eea.europa.eu/maps/ozone/welcome.

(11) http://ec.europa.eu/environment/ippc/eper/index.htm.

Weighted emissions of acidifying substances tracks trends in anthropogenic atmospheric emissions of acidifying substances (sulphur dioxide, nitrogen oxides and ammonia) by source sector. Acidifying substance emissions are combined in terms of their acidifying effects, and expressed in acid equivalents.

Main findings

Although the data is incomplete in terms of country coverage, the highest concentration of particulate matter among people living in urban areas was found in Bulgaria and Romania in 2006, at upwards of 75 % more than the EU-27 average level. Exposure to air pollution by ozone was highest for the urban populations of Italy and Greece, where the mean ozone concentrations registered in 2006 were about 75 % higher than the EU-27 average. These measures of air pollution were relatively low in Finland, Sweden and the United Kingdom in 2006.

Carbon dioxide is by far the most common type of air pollutant, with more 4 258 million tonnes released across the EU-27 in 2006, up slightly on the level in 1996. The developments among the Member States were largely as described for GHGs as a whole, as presented in Subchapter 12.1, with a rise of almost 50 % in carbon dioxide levels in Spain and 40 % in Cyprus being by far the steepest. In contrast, there were relatively large reductions in the amounts of other air pollutants released in the EU-27; the amounts of carbon monoxide released declined by over a third (37.6 %) in the ten years through until 2005, of nitrous oxides and methane by a little over a fifth (down 22.7 % and 21.7 % respectively) and of sulphur oxides by about 8 %. Aside from carbon dioxide, there were declines in the emissions of air pollutants in almost all of the Member States, particularly sharp declines being recorded in the United Kingdom (up to twice the average rate across the EU-27). Among the exceptions, there were higher emission levels of carbon monoxide in Finland and Latvia, and notably higher emissions of methane in Spain, sulphur oxides in Denmark and nitrogen oxides in Austria and Spain.

When related to the size of each Member States' population, carbon dioxide emissions were between 25 % and 45 % higher than the EU-27 average in Finland, the Czech Republic, Estonia, Belgium and Ireland. The particularly high figure for Luxembourg is at least in part explained by the high proportion of the country's workforce that live over the border in neighbouring Belgium, Germany or France. In contrast, carbon dioxide emissions were less than one half of the EU-27 figure per head of population in Lithuania and Latvia.

Emissions of acidifying substances contribute to acid deposition, leading among other things to potential changes in soil and water quality and damage to forests, crops and other vegetation, and to adverse effects on aquatic ecosystems in rivers and lakes. About one quarter (25.7 %) of the emissions of acidifying substances across the EU-27 in 2006 came from agriculture, with another quarter (24.7 %) coming from energy industries (particularly the coal-based energy industry).

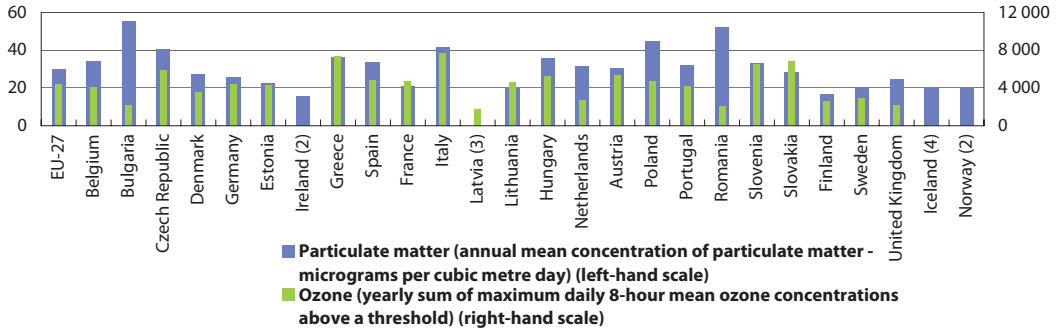
Table 12.2: Air pollutants

	Emissions of carbon dioxide (million tonnes)		Emissions of carbon monoxide (million tonnes)		Emissions of methane (million tonnes)		Emissions of sulphur oxides (million tonnes of SO_2 equivalent)		Emissions of nitrogen oxides (million tonnes of NO_2 equivalent)	
	1996	2006	1995	2005	1996	2006	1995	2005	1995	2005
EU-27	4 241.7	4 257.6	51.08	31.89	25.49	19.96	17.16	15.82	14.60	11.29
Belgium	128.0	119.1	1.11	0.88	0.46	0.34	0.26	0.24	0.37	0.29
Bulgaria	65.0	55.1	0.85	0.74	0.73	0.54	1.48	1.42	0.27	0.23
Czech Republic	138.4	127.9	1.00	0.51	0.64	0.57	1.09	0.94	0.37	0.28
Denmark	74.0	57.6	0.71	0.61	0.29	0.26	0.14	0.17	0.26	0.19
Germany	943.3	880.3	6.53	4.03	3.73	2.18	1.73	1.45	2.17	1.44
Estonia	18.7	16.0	0.21	0.16	0.10	0.10	0.12	0.12	0.04	0.03
Ireland	37.1	47.3	0.32	0.23	0.67	0.63	0.16	0.15	0.12	0.12
Greece	89.3	109.7	1.32	*0.64*	0.44	0.40	0.54	*0.52*	0.32	*0.32*
Spain	243.0	359.6	3.22	*2.38*	1.55	1.79	1.81	*1.58*	1.33	*1.53*
France	402.4	404.3	9.57	5.68	3.26	2.67	0.97	0.94	1.65	1.21
Italy	439.3	488.0	7.17	*4.21*	2.10	1.82	1.32	*1.21*	1.81	*1.17*
Cyprus	5.9	8.2	*0.10*	0.04	0.04	0.04	0.04	0.05	0.02	0.02
Latvia	9.2	8.3	0.32	0.34	0.09	0.08	0.05	0.05	0.04	0.04
Lithuania	15.9	14.5	0.29	0.19	0.17	0.16	0.09	0.09	0.07	0.06
Luxembourg	9.4	12.1	0.11	*0.04*	0.02	0.02	0.01	*0.01*	0.02	*0.01*
Hungary	63.4	60.4	0.76	0.59	0.40	0.37	0.70	0.67	0.19	0.20
Malta	2.3	2.6	:	:	0.01	0.02	*0.03*	0.03	*0.01*	0.01
Netherlands	177.7	172.2	0.86	0.60	1.10	0.78	0.13	0.12	0.47	0.34
Austria	67.4	77.3	1.01	0.72	0.40	0.33	0.05	0.04	0.19	0.23
Poland	374.9	330.5	4.55	3.33	2.05	1.77	2.38	2.37	1.12	0.81
Portugal	50.3	64.5	0.85	0.65	0.54	0.56	0.33	0.27	0.27	0.28
Romania	135.4	111.0	*2.09*	1.41	1.62	1.38	*0.89*	0.86	*0.32*	0.31
Slovenia	15.7	16.9	0.09	0.08	0.10	0.10	0.13	0.11	0.07	0.06
Slovakia	42.4	40.0	0.42	0.30	0.22	0.22	0.25	0.23	0.18	0.10
Finland	64.0	68.1	0.44	0.52	0.29	0.22	0.10	0.11	0.26	0.18
Sweden	61.6	51.5	0.90	0.60	0.32	0.26	0.07	0.07	0.28	0.20
United Kingdom	568.0	554.8	6.30	2.42	4.17	2.33	2.32	1.97	2.38	1.63
Croatia (1)	16.9	*23.0*	0.34	*0.31*	0.12	*0.15*	0.08	*0.06*	0.06	*0.07*
FYR of Macedonia	:	:	*0.02*	0.10	:	:	*0.02*	0.02	*0.01*	0.03
Turkey (1)	190.7	256.9	3.99	*3.78*	2.14	2.35	1.01	*1.16*	0.80	*0.95*
Iceland (1)	2.4	2.9	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00
Liechtenstein (1)	0.2	0.2	0.00	*0.00*	0.00	0.00	0.00	*0.00*	0.00	*0.00*
Norway (1)	40.8	43.2	0.73	0.45	0.24	0.22	0.03	0.03	0.21	0.20
Switzerland (1)	44.1	46.0	0.49	0.33	0.19	0.17	0.03	0.03	0.12	0.09

(1) 2005 instead of 2006 for emissions of carbon dioxide and methane.

Source: Eurostat (ten00073, ten00070, ten00074, ten00067 and ten00068)

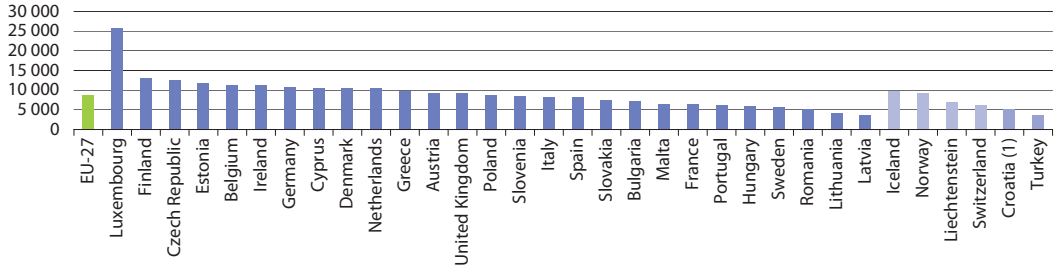
Figure 12.4: Urban population exposure to air pollution - population weighted, 2006 (1)



(1) Cyprus, Luxembourg and Malta, not available.
(2) Ozone, not available.
(3) Particulate matter, not available.
(4) Ozone, 2005.

Source: Eurostat (tsien110), European Environment Agency, European Topic Center on Air and Climate Change

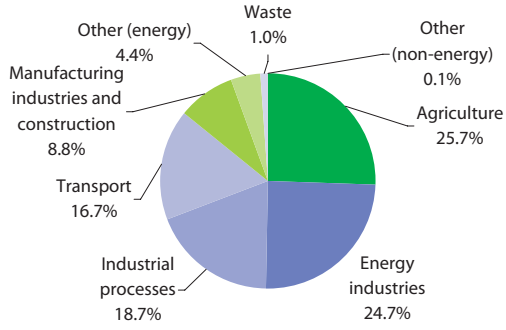
Figure 12.5: Emissions of carbon dioxide, 2006
(kg per capita)



(1) Estimate.

Source: Eurostat (ten00073 and tps00001)

Figure 12.6: Weighted emissions of acidifying substances, by sector, EU-27, 2005 (1)
(%, based on acid equivalents)



(1) Total emissions were 745 210 tonnes of acid equivalent; figures do not sum to 100 % due to rounding.

Source: Eurostat (tsdpc260), European Environment Agency, Topic Centre on Air and Climate

12.3 Water

Introduction

Water is essential for life, as well as an indispensable resource for the economy, while playing a fundamental role in the climate regulation cycle. The management and the protection of water resources, of fresh and salt water ecosystems, and of the water we drink and bathe in are therefore major concerns all around the world.

A study conducted for the European Commission estimates that water use efficiency could be improved by nearly 40 % through technological improvements alone and that changes in human behaviour or production patterns could increase such savings further. In a scenario without changes in practices it is estimated that water consumption by the public, industry and agriculture would increase by 16 % by 2030. Conversely, the use of water saving technologies and irrigation management in the industrial and agricultural sectors could reduce excesses by as much as 43 %, while water efficiency measures could decrease water wastage by up to a third.

In a Communication on water scarcity and droughts [12] adopted in July 2007, the European Commission identified an initial set of policy options to be taken at European, national and regional levels to address water scarcity within the EU. This set of proposed policies aims to move the EU towards a water-efficient and water-saving economy. Indeed, both the quality and availability of water are major concerns in many regions. While water resources are limited, water quality is affected by human activities such as industrial production, household discharges, or arable farming (the latest report [13] on the protection of waters against pollution by nitrates from agricultural sources being issued in March 2007). The pollution of rivers, lakes and groundwater remains of worldwide concern. Increasingly variable weather patterns and catastrophic floods (such as the those along the Danube and Elbe in 2002) prompted a review of flood risk management, which culminated in a European Commission Directive [14] of November 2007 that aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity.

The majority of the EU's population is connected to public water supplies, with the proportion rising close to 100 % in most Member States. Looking at the 'other end of the pipe', namely the treatment of wastewater, a number of countries reported that less than half of their population was connected to urban wastewater treatment.

(12) COM(2007) 414 final; http://eur-lex.europa.eu/LexUriServ/site/en/com/2007/com2007_0414en01.pdf.

(13) COM(2007) 120 final; http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52007DC0120:EN:NOT.

(14) Directive 2007/60/EC of 26 November 2007: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:288:0027:0034:EN:PDF.

Definitions and data availability

Water statistics are collected through the inland waters section of a joint OECD/Eurostat questionnaire which is continuously adapted to the EU policy framework. It currently reports on the following:

- **freshwater resources** in groundwater and surface waters – these can be replenished by precipitation and by external inflows (water flowing in from other territories);
- **water abstraction** – a major pressure on resources, although a large part of the water abstracted for domestic, industrial (including energy production), or agricultural use is returned to the environment and its water bodies, but often as wastewater with impaired quality;
- **water use**, analysed by supply category and by industrial activities;
- treatment capacities of **wastewater treatment plants and the share of the population connected to them** – this gives an overview of the development status of the infrastructure, in terms of quantity and quality, that is available for the protection of the environment from pollution by wastewater;
- **sewage sludge production and disposal** – an inevitable product of wastewater treatment processes; its impact on the environment depends on the methods chosen for its processing and disposal;
- **generation and discharge of wastewater** – pollutants present in wastewater have different source profiles, and similarly the efficiency of treatment of any pollutant varies according to the method applied.

Statistics on water resources are usually calculated on the basis of long-term annual averages of at least 20 years, to take account of the fluctuations in rainfall and evaporation/transpiration from one year to the next. **Precipitation** is defined as the total volume of atmospheric wet precipitation (mainly rain, snow and hail) and is usually measured by meteorological or hydrological institutes. **Evapotranspiration** is the volume of water that is transported from the ground (including inland water surfaces – streams, rivers, freshwater lakes and glaciers) into the atmosphere by evaporation or by transpiration of plants. Internal flow is defined as the total volume of river run-off and groundwater generated, in natural conditions, exclusively by precipitation into a territory. The **internal flow** is equal to precipitation less evapotranspiration and can be calculated or measured. If the river run-off and groundwater generation are measured separately, transfers between surface and groundwater should be netted out to avoid double counting. **External inflow** is the volume of inflow derived from rivers and groundwater that originate in a neighbouring territory. Freshwater resources refer to the volume

of water resulting from internal flow and external inflow. **Outflow** is the volume of water that flows from rivers and groundwater into the sea and into neighbouring territories. Total additional freshwater resources available are calculated as the sum of internal and external flows.

Fresh surface water is defined as water which flows over, or rests on the surface of a land mass, natural watercourse – such as rivers, streams, brooks and lakes – as well as artificial watercourse – such as irrigation, industrial and navigation canals, drainage systems and artificial reservoirs. **Fresh groundwater** is defined as freshwater which is being held in, and can usually be recovered from, or via, an underground formation. All permanent and temporary deposits of water, both artificially charged and naturally, in the subsoil, of sufficient quality for at least seasonal use. **Total freshwater resources** is the total volume of water that is additionally available due to internal flow and external inflow.

Water abstraction covers **groundwater abstraction** and surface water abstraction. Groundwater abstraction is abstraction of freshwater from underground deposits. These can be permanent or temporary, both artificially charged or naturally. Groundwater includes springs, both concentrated and diffused, which may also be subaqueous. **Surface water abstraction** is water abstracted from natural or artificial surface watercourses holding freshwater, such as lakes, rivers, streams, canals etc.

Public water is that supplied by economic units engaged in the collection, purification and distribution of water (including desalting of sea water to produce water as the principal product of interest, and excluding system operation for agricultural purposes and treatment of wastewater solely in order to prevent pollution); corresponds to NACE Rev. 1.1 Division 41.

Wastewater is defined as water which is of no further immediate value to the purpose for which it was used or in the pursuit of which it was produced because of its quality, quantity or time of occurrence. However, wastewater from one user can be a potential supply to another user elsewhere. Domestic wastewater is defined as wastewater from residential settlements and services which originates predominantly from the human metabolism and from household activities. Urban wastewater is domestic wastewater or the mixture of domestic wastewater with industrial wastewater and/or run-off rain water. **Urban wastewater treatment** is all treatment of wastewater in urban wastewater treatment plants (UWWTPs). UWWTPs are usually operated by public authorities or by private enterprises working by order of public authorities. This includes wastewater delivered to treatment plants by trucks. This approach used in international water statistics is different to the concept applied in the EU Urban Wastewater Treatment Directive (91/271/EC) where only a system of conduits (sewage pipes) is taken into account for connection to the treatment plant. The

population connected to urban wastewater treatment relates to the proportion of persons who are connected to any kind of sewage treatment that is carried out in municipal treatment plants by public authorities or private enterprises on behalf of local authorities. Thereby, urban wastewater is treated by a process generally involving biological treatment with a secondary settlement or other process, resulting in a biochemical oxygen demand (BOD) removal of at least 70 % and a chemical oxygen demand (COD) removal of at least 75 %.

Main findings

Given the natural resources available, geographical characteristics and freshwater management, there are wide differences among the countries in terms of freshwater resources. On the basis of long-term annual averages of at least 20 years among the Member States, an overall picture shows that Finland and Sweden recorded the highest volume of freshwater resources per capita in 2006, while the Czech Republic and Cyprus recorded the lowest averages.

There are considerable differences between Member States in the amount of water that is abstracted from the ground or from surface areas (like lakes and rivers), in part reflecting the resources available on the one hand but also, on the other, abstraction practices for public water supply, industrial purposes, agricultural purposes, land drainage and land sealing. Where time-series are available, the amount of groundwater extracted by Member States in 2005 was generally lower than in 1995; in Bulgaria, Lithuania, Latvia, and the Czech Republic and Romania, extraction was about one half its level of 1995. The three main exceptions were Spain, Slovenia and Finland, where extraction levels were between 10 % and 15 % higher.

Developments in surface water abstraction levels were even more contrasting. In Slovenia, surface water abstraction levels in 2005 were about three quarters less than in 1995, with strong declines also recorded in Romania, Lithuania, Latvia, Slovakia, the Czech Republic and Belgium. In contrast, surface water abstraction levels in Spain increased by about 15 % to 32 000 million m^3 in 2004, the highest level among those Member States for which information is available.

The population connected to urban wastewater treatment relates to the proportion of persons who are connected to any kind of sewage treatment (on behalf of local authorities). Although the data set is incomplete, only in seven of the 19 Member States with available data did the proportion of households connected to the urban wastewater treatment near or exceed 80 % in 2005, with the proportion almost reaching 100 % in the Netherlands. At the other end of the spectrum, household connection rates were less than 40 % in six of the Member States, with a relatively low proportion in Malta, where the connection rate was around 13 % (but new treatment plants are under construction).

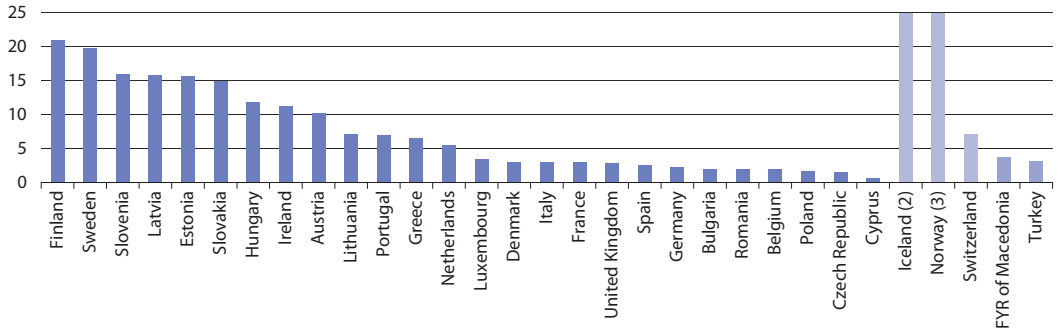
Table 12.3: Groundwater and surface water abstraction

	Groundwater abstraction (million m³)			Surface water abstraction (million m³)		
	1995	2000	2005	1995	2000	2005
Belgium (1)	685	640	640	7 500	6 833	5 936
Bulgaria	907	574	447	5 419	5 558	5 570
Czech Republic	719	555	385	2 024	1 363	1 564
Denmark (2)	887	709	659	:	17	21
Germany	7 623	:	:	35 751	:	:
Estonia (2)	350	255	310	1 430	1 216	:
Ireland	:	:	364	:	:	435
Greece	3 119	:	:	4 614	:	:
Spain (2)	5 408	4 979	6 196	27 880	32 091	31 963
France	:	6 259	:	:	26 456	:
Italy	:	:	:	:	:	:
Cyprus	:	137	141	:	45	81
Latvia	*195*	119	102	*222*	165	136
Lithuania	304	166	157	4 278	3 412	2 208
Luxembourg	29	:	:	28	:	:
Hungary (2)	969	740	708	:	18 138	19 991
Malta	20	19	14	0	0	0
Netherlands	:	:	1 025	:	:	9 301
Austria	1 164	:	:	2 285	:	:
Poland	2 846	:	:	10 078	:	:
Portugal	:	:	400	:	:	687
Romania	1 280	1 107	724	9 020	6 860	4 577
Slovenia	164	136	184	222	168	53
Slovakia (3)	578	448	374	808	723	621
Finland	257	*285*	*285*	2 278	:	:
Sweden (2)	661	635	628	2 064	2 053	2 048
United Kingdom	:	:	:	:	:	:
FYR of Macedonia	33	14	:	2 829	2 258	:
Turkey	8 450	10 350	11 622	*25 032*	*33 300*	:
Iceland	158	158	160	7	5	5
Norway	:	:	:	:	:	:
Switzerland	892	886	811	1 679	1 678	1 696

(1) 2003 instead of 2005.
(2) 2004 instead of 2005.
(3) 2003 instead of 2005 for surface water abstraction.

Source: Eurostat (ten00004 and ten00005)

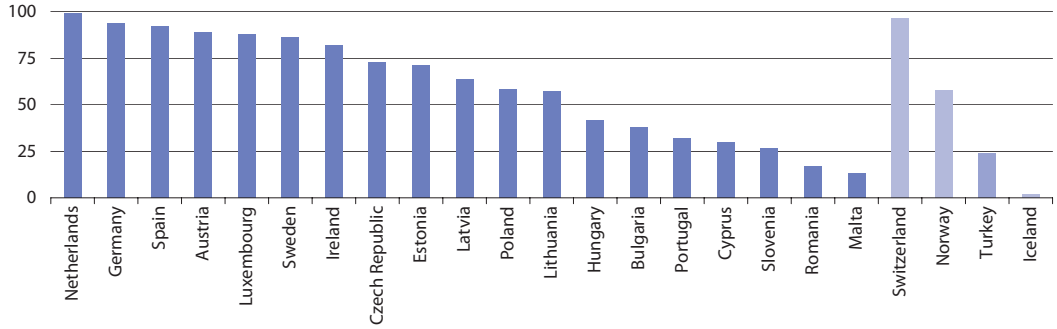
Figure 12.7: Freshwater resources per capita - long-term average (1)
(1 000 m^3 per inhabitant)



(1) The minimum period taken into account for the calculation of long term annual averages is 20 years; population data are as of 1 January 2006; Luxembourg, estimate; Malta, not available.
(2) Y-axis is cut, 566.9.
(3) Y-axis is cut, 84.2.

Source: Eurostat (ten00001 and tps00001)

Figure 12.8: Population connected to urban wastewater treatment, 2005 (1)
(%)



(1) Germany, Estonia, Hungary, Austria and Turkey, 2004; Luxembourg and Portugal, 2003; Belgium, Denmark, Greece, France, Italy, Slovakia, Finland and the United Kingdom, not available.

Source: Eurostat (tsdnr320)

12.4 Waste

Introduction

Waste refers to materials for which the generator has no further use for their own purpose of production, transformation or consumption; these materials are discarded. In some circumstances there may be statutory requirements on a producer to dispose of waste in a certain manner, for example, when waste materials are hazardous.

The EU's sustainable development strategy and the sixth environment action programme, which identifies waste prevention and management as one of four top priorities, underline the relationship between the efficiency of resources and waste generation and management. The objective is to decouple the use of resources and generation of waste from economic growth, while sustainable consumption should not exceed environmental capacity.

The EU's approach to waste management is based on three principles: waste prevention, recycling and reuse, and improving final disposal and monitoring. Waste prevention can be achieved through cleaner technologies, eco-design, or more eco-efficient production and consumption patterns. Waste prevention and recycling, focused on materials technology, can also reduce the environmental impact of resources that are used through limiting raw materials extraction and transformation during production processes. Where possible, waste that cannot be recycled or reused should be safely incinerated, with landfill only used as a last resort. Both these methods need close monitoring because of their potential for causing severe environmental damage.

The European Commission has defined several specific waste streams for priority attention, the aim being to reduce their overall environmental impact; this includes packaging waste, end-of-life vehicles, batteries, electrical and electronic waste. Member States are required to introduce legislation on waste collection, reuse, recycling and disposal of these waste streams. In 2006 the new Waste Framework Directive [15] and the Waste Shipment Regulation [16] were adopted by the European Parliament and the Council, with the aim to strengthen, simplify and clarify the control procedures applicable to waste management.

Definitions and data availability

In order to be able to monitor the implementation of waste policy, in particular compliance with the principles of recovery and safe disposal, reliable **statistics on the production and management of waste** from businesses and private households are needed. In 2002, Regulation No 2150/2002/EC on waste statistics [17] was adopted, creating a framework for harmonised Community statistics on waste.

Starting with the reference year 2004, the Regulation requires the EU Member States to provide data on the generation, recovery and disposal of waste every two years. Thus, the Regulation on waste

(15) Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006); http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_114/l_11420060427en00090021.pdf.

(16) Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14 June 2006; http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_190/l_19020060712en00010098.pdf.

(17) Regulation (EC) No 2150/2002 of the European Parliament and of the Council of 25 November 2002; http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:332:0001:0036:EN:PDF.

statistics replaces the Eurostat/OECD Joint Questionnaire as the main source of European waste data. Whereas reporting by the Joint Questionnaire was voluntary, the provisions of the Regulation are binding by law. The second delivery of data based on the Regulation on waste statistics was in June 2008; and hence, data are now available for the reference years 2004 and 2006.

The concept of 'municipal waste', a central waste category of the Joint Questionnaire is replaced in the new Regulation by the category 'waste generated by households'. The concept of municipal waste has always been disputed as its content is directly linked to different national or regional waste management systems. However, data on municipal waste generation and treatment are still collected annually from the countries, as it is part of the series of structural indicators on the environment.

Municipal waste consists of waste collected by or on behalf of municipal authorities and disposed of through the waste management system. The information presented on municipal waste includes waste generated by various branches of economic activity and households (which accounts for the bulk of this waste stream). The quantity of waste generated is expressed in kg per person per year. Data for **waste recovery and recycling** is not collected from countries but calculated as the difference between municipal waste generation and municipal waste incinerated and landfilled.

Treatment of municipal waste can be classified into three principal categories:

- **landfill**, which is defined as the depositing of waste into or onto land, including specially engineered landfill, and temporary storage of over one year on permanent sites;.the definition covers both landfill in internal sites (i.e. where a generator of waste is carrying out its own waste disposal at the place of generation) and in external sites;
- **incineration**, which refers to the thermal treatment of waste in specifically designed incineration plants as defined in Article 3(4) or co-incineration plants as defined in Article 3(5) of the Directive on the incineration of waste (Directive 2000/76/EC of 4 December 2000), and;
- **recovery**, which refers to any waste management operation that diverts a waste material from the waste stream and which results in a certain product with a potential economic or ecological benefit.

The disposal of waste can have a serious environmental impact: for example, landfill takes up land space, and may cause air, water and soil pollution. Incineration can also result in emissions of dangerous air pollutants, unless properly regulated.

Main findings

On average across the EU-27, each individual generated the equivalent of 517 kg of municipal waste in 2006, some 6.6 % more than in 1996, although slightly lower than in 2001. During this period, the way in which waste was treated changed significantly. About 60 % of municipal waste was put into landfill in 1996, with a further 14 % being incinerated, the rest being treated in other ways, such as recycling and composting. By 2006, the proportion of municipal waste that was put into landfill had declined to 41 %, recycling and composting becoming a much more significant form of treatment in many countries.

Municipal waste per inhabitant in 2006 was between 33 % and 50 % higher than the EU-27 average in Ireland, Cyprus, Denmark and Luxembourg, in each case rising relatively progressively from levels recorded in 1996. In contrast, average waste levels were between 40 % and 50 % lower than the EU-27 average in Poland and the Czech Republic. In the ten years through to 2006, average municipal waste per inhabitant declined by 170 kg in Bulgaria, the highest decline of any Member State, followed closely by Slovenia (158 kg), Germany (76 kg) and Poland (42 kg).

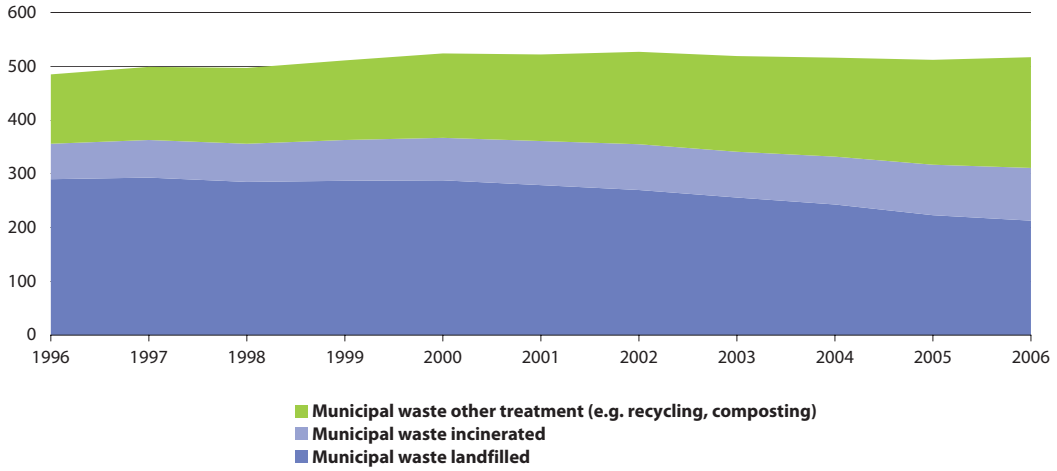
In Germany, the amount of municipal waste going into landfill shrank from 225 kg per head in 1996 to only 4 kg in 2006. There were also significant reductions to below 60 kg per head in Belgium, the Netherlands, Austria and Sweden. In contrast, the amount of municipal waste going into landfill rose sharply in Malta, Romania, Slovakia, Greece and Cyprus.

Those countries that reduced the use of landfill tended to have relatively high levels of waste incineration in 2006. Newly installed waste incinerators are equipped with systems for energy recovery. Energy statistics show that a large proportion of energy recovery from waste took place in France, Germany, Sweden and Spain in 2006.

Under the Waste Statistics Regulation, Member States reported that in 2006 in the EU-27 about 2 950 million tonnes of waste were generated by economic activities and by households, of which some 88 million tonnes involved hazardous waste. It has to be noted that a large share of the total was generated by construction (including demolition) activities and by mining and quarrying industries, while manufacturing industries produced the majority of the hazardous waste.

About 70 million tonnes of metallic waste were recovered across the EU-27 in 2006, with a further 37 million tonnes of paper and cardboard and 12 million tonnes of glass. A majority of these products were recovered in Germany, Spain, France, Italy and the United Kingdom, although a significant amount of metal recovery took place in Poland (11.4 % of the EU-27 total) and of paper and cardboard in the Netherlands (7.1 % of the EU-27 total).

Figure 12.9: Municipal waste, EU-27
(kg per inhabitant)



Source: Eurostat (tsien120 and tsien130)

Table 12.4: Municipal waste
(kg per capita)

	Municipal waste generated (1)			Municipal waste landfilled (2)			Municipal waste incinerated (3)		
	1996	2001	2006	1996	2001	2006	1996	2001	2006
EU-27	485	522	517	290	279	213	66	82	98
Euro area	525	570	557	265	247	173	86	106	125
Belgium	451	*467*	*475*	189	54	*24*	152	160	*155*
Bulgaria	616	491	446	477	392	356	0	0	0
Czech Republic	*310*	273	296	*310*	*214*	234	0	35	29
Denmark	619	658	*737*	82	47	*37*	308	374	*405*
Germany	*642*	*633*	*566*	*225*	160	*4*	*106*	135	*179*
Estonia	396	372	*466*	396	295	*278*	0	1	*1*
Ireland	*524*	705	*804*	*419*	540	*471*	0	0	0
Greece	337	417	443	*322*	380	386	0	0	0
Spain	536	658	*583*	*298*	364	*289*	*25*	37	*41*
France	486	528	*553*	225	215	*192*	170	175	*183*
Italy	457	516	*548*	380	346	*284*	*27*	45	*65*
Cyprus	642	703	745	593	634	652	0	0	0
Latvia	263	302	411	247	285	292	0	4	2
Lithuania	400	377	390	400	335	356	0	0	0
Luxembourg	589	650	*702*	163	131	*131*	306	275	*266*
Hungary	468	451	468	367	375	376	32	35	39
Malta	*344*	542	652	*317*	494	562	0	0	0
Netherlands	563	615	625	115	50	12	171	199	213
Austria	517	578	*617*	186	192	59	54	65	*181*
Poland	301	290	259	295	278	236	0	0	1
Portugal	399	472	*435*	231	355	*274*	0	104	*95*
Romania	333	345	*385*	235	272	*326*	0	0	0
Slovenia	*590*	479	432	*465*	358	362	0	0	3
Slovakia	275	239	301	172	*209*	234	28	25	36
Finland	*410*	466	488	*275*	284	286	0	41	42
Sweden	385	442	497	126	99	25	147	169	233
United Kingdom	512	592	588	440	474	353	36	43	55
Turkey	471	457	*434*	345	360	*364*	0	0	0
Iceland	437	469	*534*	328	353	*370*	82	53	*47*
Norway	632	635	793	425	274	245	81	99	132
Switzerland	602	659	715	69	40	1	282	315	355

(1) Breaks in series for Estonia (2001), Latvia (2006), Lithuania (1999), Hungary (2000), Malta (1999), Portugal (2002), Slovenia (2002), Slovakia (2002), Turkey (2004) and Switzerland (2004).
(2) Breaks in series for Estonia (2001), Latvia (2006), Lithuania (1999), Hungary (2000), Malta (1999), Portugal (2002) and Turkey (2004).
(3) Break in series for Italy (2002).

Source: Eurostat (tsien120 and tsien130)

Table 12.5: Generation of waste, total arising and by selected economic activities
(1 000 tonnes)

	Total waste from economic activities and households		Manufacturing industry		Mining and quarrying activities		Construction and demolition activities		Other economic activities (services)	
	2004	2006	2004	2006	2004	2006	2004	2006	2004	2006
EU-27	*2 918 220*	*2 946 667*	*384 676*	*363 743*	*862 155*	*740 743*	:	:	*146 754*	*155 807*
Belgium	52 809	59 352	*18 177*	*15 308*	*384*	*159*	*11 037*	*13 090*	*8 689*	*7 039*
Bulgaria	252 058	242 489	5 611	4 316	222 231	225 338	2 999	1 023	9 181	1 473
Czech Republic	29 276	24 746	8 618	5 932	708	472	8 131	8 380	933	1 025
Denmark	12 814	12 821	1 555	1 179	0	0	4 274	5 802	1 515	1 486
Germany	364 022	363 786	30 163	31 705	55 880	47 222	191 563	196 536	16 343	15 107
Estonia	20 861	18 933	6 288	3 981	5 306	5 961	489	717	1 720	1 601
Ireland	24 513	*30 005*	*5 356*	*4 067*	4 046	4 793	11 287	16 599	1 184	1 327
Greece	34 953	51 325	4 554	5 285	1 902	14 888	3 324	6 829	*1 518*	1 518
Spain	*160 668*	160 947	28 377	22 427	21 780	26 015	46 320	47 323	14 194	15 376
France	429 153	445 865	21 434	22 973	166	1 040	:	:	*24 158*	*24 158*
Italy	139 806	155 025	39 472	39 997	761	1 005	49 151	52 316	3 860	5 534
Cyprus	2 332	1 870	557	413	119	60	488	307	*403*	403
Latvia	1 257	1 859	349	570	0	0	8	19	99	239
Lithuania	7 010	7 665	2 632	*2 948*	4	*6*	357	*349*	158	*586*
Luxembourg	8 322	9 586	725	604	46	56	6 985	6 775	179	243
Hungary	*24 661*	*22 287*	*5 071*	*5 528*	*1 640*	*27*	*1 736*	*3 045*	*1 965*	*2 445*
Malta	2 482	2 861	*10*	50	0	0	2 206	2 493	160	173
Netherlands	*88 099*	*93 808*	*16 086*	*15 562*	*296*	*213*	*49 612*	*56 610*	*5 276*	*5 349*
Austria	53 021	54 287	15 073	11 470	622	1 043	27 935	31 322	2 856	3 458
Poland	251 243	266 741	61 514	61 131	38 311	38 671	1 993	14 141	1 965	3 512
Portugal	*29 272*	*34 077*	*10 123*	*14 699*	*4 761*	*3 563*	*2 626*	*3 607*	*4 202*	*10 352*
Romania	371 503	331 863	11 156	9 184	326 553	199 138	54	34	3 096	3 841
Slovenia	5 771	6 036	1 960	2 385	129	377	908	995	426	429
Slovakia	10 668	14 502	3 878	5 527	211	332	1 404	916	761	4 859
Finland	74 361	72 205	23 266	17 976	23 819	21 501	20 843	23 146	1 276	1 668
Sweden	109 741	115 583	27 614	30 363	58 600	62 084	10 272	8 943	*1 517*	1 517
United Kingdom	357 544	346 144	35 056	28 161	93 883	86 779	99 234	109 546	39 120	41 088
Croatia	7 209	:	3 695	:	347	:	646	:	116	:
Turkey	58 820	46 092	16 325	:	:	:	:	:	62	:
Iceland	501	:	*61*	:	1	:	19	:	6	:
Norway	7 454	9 051	2 956	3 519	116	136	1 101	1 248	865	1 472

Source: Eurostat (env_wasgen)

Table 12.6: Waste treatment (non-hazardous), recovery, 2006
(1 000 tonnes)

	Metallic waste	Glass waste	Paper and cardboard waste	Rubber waste	Plastic waste	Wood waste	Textile waste
EU-27 (1)	*69 935*	*11 816*	*37 789*	*1 508*	:	:	*1 651*
Belgium	2 711	282	630	8	130	440	10
Bulgaria	1 148	47	125	2	24	0	3
Czech Republic	1 307	50	201	13	89	120	18
Denmark	942	131	788	54	54	863	:
Germany	7 648	2 024	5 922	192	1 119	2 502	68
Estonia	4	7	6	6	10	398	0
Ireland	31	14	26	9	25	180	7
Greece	644	54	425	31	42	63	9
Spain	5 083	1 412	3 346	352	1 450	573	79
France	10 136	2 174	6 050	230	435	3 727	388
Italy (1)	6 981	1 429	3 335	49	959	4 248	244
Cyprus	18	4	45	1	26	5	0
Latvia	9	1	18	1	8	0	0
Lithuania	15	26	141	11	36	34	1
Luxembourg	:	:	0	0	:	:	0
Hungary	760	21	344	10	49	174	1
Malta	0	1	3	1	0	1	0
Netherlands	*1 910*	*483*	*2 688*	*73*	*265*	*1 317*	*92*
Austria	1 160	249	1 425	30	164	2 282	34
Poland	8 004	136	212	785	446	419	1 294
Portugal (1)	558	237	345	43	98	1 109	56
Romania	2 319	80	335	9	198	109	4
Slovenia	750	:	373	:	22	:	:
Slovakia	509	11	108	11	29	421	3
Finland	1 266	149	734	24	5	4 122	0
Sweden	1 866	:	1 846	35	:	10 916	0
United Kingdom	10 538	*1 198*	*4 174*	25	*426*	*2 747*	117
Croatia (1)	16	13	4	1	3	35	0
Turkey	9	7	23	2	13	0	1
Iceland (1)	0	*6*	*8*	*4*	2	23	1
Norway	880	91	670	39	36	348	13

(1) 2004.

Source: Eurostat (env_wastrt)

12.5 Environment and economy

Introduction

Resources are the backbone of every economy. In using resources and transforming them, capital stocks are built up which add to the wealth of present and future generations. However, the dimensions of our current resource use are such that the chances of future generations – and the developing countries – to have access to their fair share of scarce resources are endangered. Moreover, the consequences of our resource use in terms of impacts on the environment may induce serious damages that go beyond the carrying capacity of the environment. These effects risk being aggravated once the developing world has taken up growth and resource use similar to the levels currently experienced in (post-)industrialised countries.

A key component of the EU's environment and health action programme within the sixth EAP is the need for a complete overhaul of EU policy on chemicals management. A European Regulation [18] on the Registration, Evaluation, Authorisation and restriction of Chemicals (REACH) came into force in June 2007. The major objective of REACH is to ensure a high level of protection for human health and the environment, including promotion of alternative methods for the assessment of hazards of substances as well as the free circulation of substances on the internal market while enhancing competitiveness and innovation in the EU chemical industry. Through different types of measures, REACH is expected to lead to a decrease in risks to human health and the environment.

The EU's eco-management and audit scheme (EMAS) is a management tool for enterprises and other organisations to evaluate, report and improve their environmental performance. Enterprises have been able to participate in the scheme since 1995 [19]. It was originally restricted to enterprises within the industrial economy, however, since 2001 EMAS has been open to all economic sectors including public and private services. In addition, EMAS was strengthened by the integration of the ISO 14001 international standard, which is primarily concerned with environmental management and aims to help organisations establish or improve an environmental management system, to minimise harmful effects on the environment caused by its activities, and continually improve their environmental performance [20]. Organisations participating in EMAS are committed to evaluate and improve their own environmental performance, comply with relevant environmental legislation, prevent pollution, and provide relevant information to the public (via verified environmental audits). In July 2008 the European Commission proposed to revise EMAS to increase the participation of companies and reduce the administrative burden and costs, particularly for small and medium-sized enterprises [21].

(18) http://ec.europa.eu/environment/chemicals/index.htm.

(19) Council Regulation (EEC) No 1836/93 of 29 June 1993; http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31993R1836:EN:HTML.

(20) Commission Regulation (EC) No 196/2006 of 3 February 2006 amending Annex I to Regulation (EC) No 761/2001 of the European Parliament and of the Council to take account of the European Standard EN ISO 14001:2004, and repealing Decision 97/265/EC; http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_032/l_03220060204en00040012.pdf.

(21) http://ec.europa.eu/environment/emas/pdf/com_2008_402_draft.pdf.

Definitions and data availability

Resource productivity measures the efficiency with which the economy uses energy and materials (the natural resource inputs needed to achieve a given economic output). If the definition of natural resources includes pollution sinks – the capacity of the atmosphere, the land area and the world's oceans and rivers to absorb waste and pollution – resource productivity also measures the economy's ability to produce goods and services relative to its environmental impacts. This wider measure is particularly useful to policy-makers, because there are pressing concerns regarding the way in which pollution sinks are being used up as a resource. Resource productivity is defined as GDP divided by **domestic material consumption** (DMC). DMC is related to the consumption activities of residents of a national economy (DMC = domestic extraction (DE) plus imports minus exports). The three main DMC material categories (biomass, fossil fuels and minerals) can be further disaggregated into different material categories. It is important to note that the term consumption as used in DMC denotes apparent consumption and not final consumption. DMC does not include upstream hidden flows related to imports and exports of raw materials and products.

Eurostat has developed a **production index of toxic chemicals**. This indicator presents the trend in aggregated production volumes of toxic chemicals, broken down into five toxicity classes. The classes are derived from the Risk Phrases assigned to the individual substances in Annex 6 of the Dangerous Substance Directive (Council Directive 67/548/EEC as last amended in 2001). The **toxicity classes**, beginning with the most dangerous, are: carcinogenic, mutagenic and reprotoxic (CMR-chemicals); chronic toxic chemicals; very toxic chemicals; toxic chemicals and chemicals classified as harmful. Production volumes are extracted from Prodcom (statistics on the production of manufactured goods) and are aggregated to the five classes according to their toxicity. EU-15 data covers the years from 1995 to 2007, for 2004 to 2007 data for EU-25 is available.

The **eco-management and audit scheme (EMAS)** is an EU voluntary instrument which acknowledges organisations that improve their environmental performance on a continuous basis. The scheme integrates ISO 14001 (International Standard for Environmental Management System) as its environmental management system element. EMAS registered organisations are legally compliant, run an environment management system and report on their environmental performance through the publication of an independently verified environmental statement. They are recognised by the EMAS logo, which guarantees the reliability of the information provided. To receive EMAS registration an organisation must comply with the following steps:

- conduct an environmental review;
- establish an effective environmental management system;
- carry out an environmental audit and;
- provide a statement of its environmental performance.

The EU **eco-label scheme**, as laid down in a Regulation of the European Commission[22] is now part of a wider approach on integrated product policy (IPP). The Community eco-label is awarded to products and services with reduced environmental impacts. It is administered by the European eco-labelling board (EUEB) and receives the support of the European Commission, all EU Member States and the European Economic Area. The eco-labelling board includes representatives such as industry, environment protection groups and consumer organisations. The scheme has been in operation since 1993.

Main findings

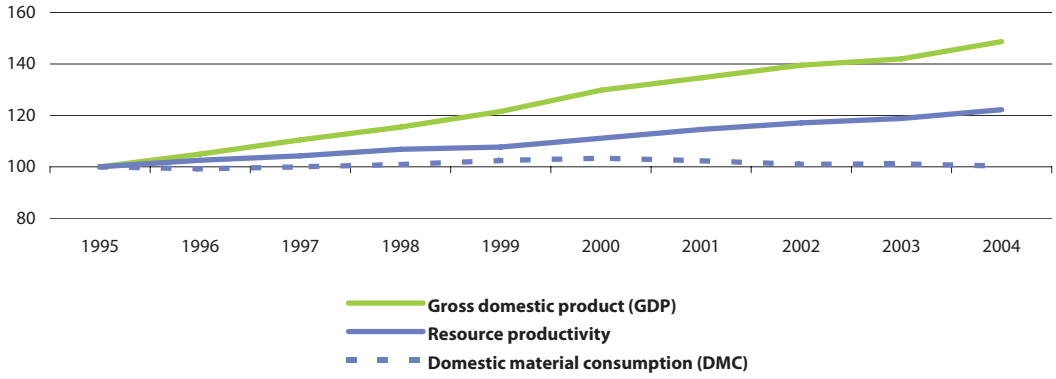
The efficient use of resources (many of which come from outside the EU) can contribute to relatively steady growth, whereas inefficiency and over-exploitation may put long-term growth in jeopardy. Although the wealth of the EU-15, as measured by GDP, increased on average by 2.3 % per annum between 1995 and 2004, the consumption activities of the EU-15's residents (domestic material consumption) remained stable over the same period of time. As a result, resource productivity during the same period rose by a little over one fifth (22.2 %) in the EU-15.

The chemicals industry is one of the largest European manufacturing sectors and it has a pivotal role in providing innovative materials and technological solutions which have a direct impact on Europe's industrial competitiveness. Manufactured chemicals can, however, have an environment impact on soil, water and air quality, and chemicals like hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6) were included in the Kyoto Protocol because they are gases related to global warming. Between 1996 and 2006 the total production of chemicals grew by 22 % (EU-15). The production of chemicals classified as toxic increased by 16 % over this period, with 10 % growth for CMR chemicals, although in both cases falling back slightly from relative highs in 2004.

The EU Eco-Management and Audit Scheme (EMAS) is a management tool for companies and other organisations to evaluate, report and improve their environmental performance. By 2007, by far the highest uptake was in Austria (just under 60 sites per million inhabitants), followed by Denmark and Belgium, with the only other countries to have a ratio in double figures being Spain, Germany and Italy. Denmark and Austria were also at the forefront of eco-label awards in 2007. In a majority of Member States, however, less than one eco-label per million inhabitants was awarded by 2007.

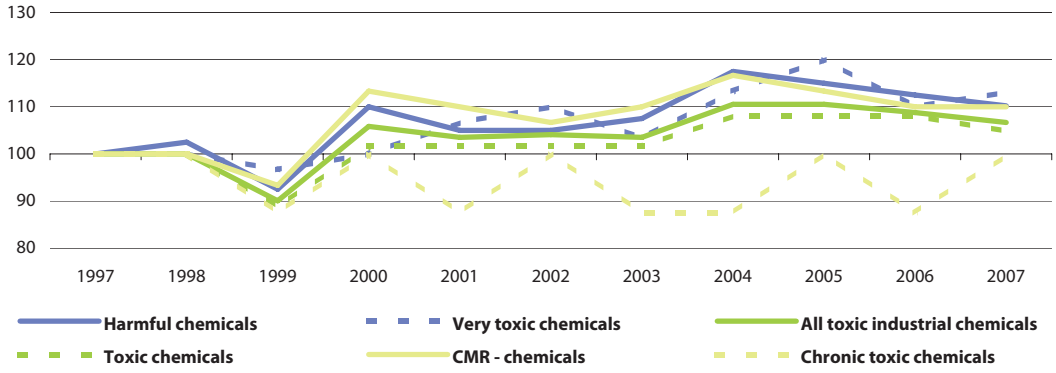
(22) Regulation (EC) No 1980/2000 of the European Parliament and of the Council of 17 July 2000: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2000/l_237/l_23720000921en00010012.pdf.

Figure 12.10: Resource productivity, EU-15
(1995=100)



Source: Eurostat (tec00001, tsien140 and tsdpc230)

Figure 12.11: Production volume of toxic chemicals, EU-15 (1)
(1997=100)

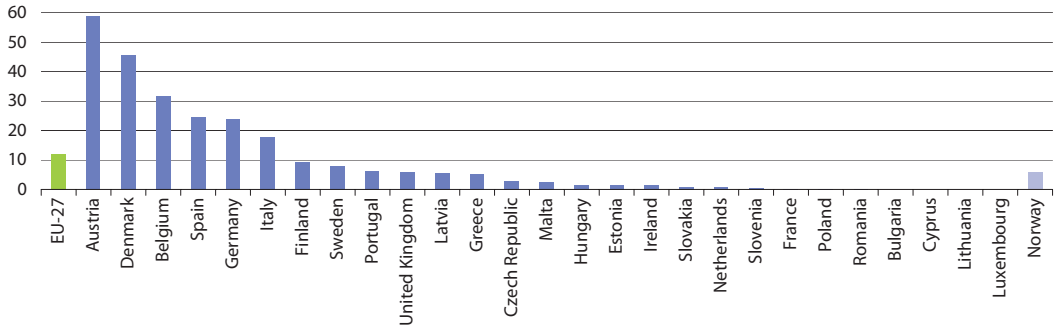


(1) In 2007, the volume of toxic chemicals produced in the EU-15 was: 317 million tonnes (EU-25: 354 million tonnes; an EU-25 time series is only available from 2004 to 2007). The share of substances classified as toxic was 183 million tonnes (EU-25: 206 million tonnes). Of the EU-25 production volume, starting with the most toxic substances, 36 million tonnes were classified as 'CMR-chemicals', 8 million tonnes as 'chronic toxic' chemicals, 39 million tonnes as 'very toxic', 74 million tonnes as 'toxic' and 49 million tonnes as 'harmful' chemicals in 2007.

Source: Eurostat (tsdph320)

Figure 12.12: Number of sites having implemented an eco-management and audit scheme (EMAS), 2007 (1)

(per million inhabitants)

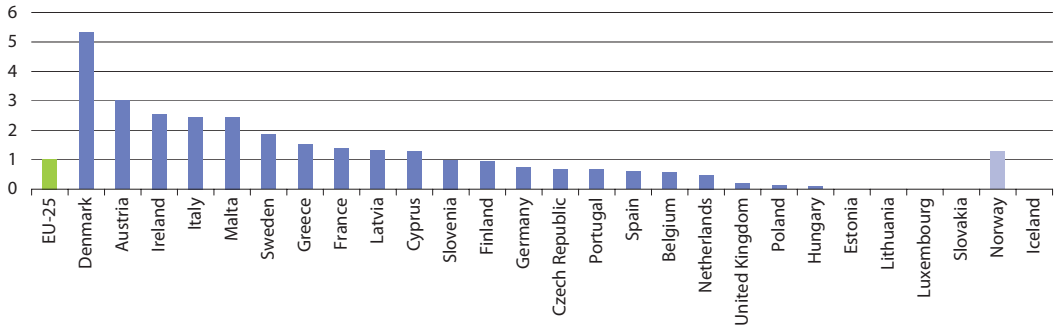


(1) EU-27, Ireland, Greece, Portugal and the United Kingdom, estimates.

Source: Eurostat (tsdpc410 and tps00001), European Commission (EMAS)

Figure 12.13: Eco-label awards, 2007 (1)

(per million inhabitants)



(1) EU-25, Ireland, Greece, Portugal and the United Kingdom, estimates; Bulgaria and Romania, not available.

Source: Eurostat (tsdpc420 and tps00001), Directorate-General Environment

12.6 Biodiversity

Introduction

A contraction of biological diversity, biodiversity reflects the number, variety and variability of living organisms, including mankind. The global scale of the biodiversity issue has led to international action within this domain, with the framework for action being the United Nations (UN) convention on biological diversity (CBD), which the EU ratified in 1993. In 1998, the EU adopted a biodiversity strategy. Four biodiversity action plans were adopted under this strategy in 2001 (conservation of natural resources, agriculture, fisheries, economic and development cooperation).

At the United Nations world summit on sustainable development in Johannesburg in 2002, governments committed themselves to significantly reducing the rate of biodiversity loss by 2010. A number of concrete measures and a programme of funding to help achieve this goal were reached at a UN Conference in Bonn in May 2008.

The EU has also set itself the objective of halting the loss of biodiversity on its own territory by 2010 [23]. Nature and biodiversity is one of four priorities of the EU's sixth environment action programme (2002-12), together with climate change, resource and waste management, and health in relation to the environment.

Definitions and data availability

EU policy on nature conservation is part of the EU's biodiversity strategy. It is essentially based on the implementation of two Directives: Council Directive 92/43/EEC of 21 May 1992 (the habitats Directive) on the conservation of natural habitats and of wild fauna and flora [24]) and Council Directive 79/409/EEC of 2 April 1979 (the birds Directive) on the conservation of wild birds, which includes the setting-up of a coherent European ecological network of sites under the title Natura 2000.

Annual data are available on **protected areas under the habitats Directive** and these are presented as a percentage of total country area. The indicator on protected areas is based on territories proposed by countries to be designated for the protection of natural and semi-natural habitats, wild fauna and flora according to the habitats Directive. The **index of sufficiency** measures the extent to which sites of Community importance proposed by the Member States adequately cover the species and habitats listed in the annexes I and II of the Habitats Directive.

Birds are considered good proxies for biodiversity and the integrity of ecosystems as they tend to be at, or near, the top of the food chain, have large ranges and can migrate and thus reflect changes in

(23) COM(2006) 216 final; http://ec.europa.eu/development/icenter/repository/com2006_0216en01_en.pdf.

(24) Council Directive 79/409/EEC of 2 April 1979 (birds Directive) and Council Directive 92/43/EEC of 21 May 1992 (habitat Directive); http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31979L0409:EN:HTML.

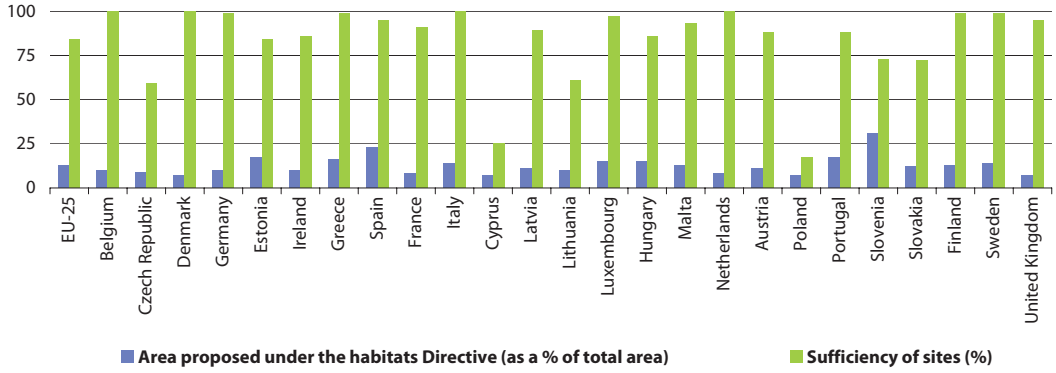
ecosystems rather rapidly. By focusing attention on the population trends of relatively large groups of abundant European species associated with different habitats, these indicators are designed to capture the overall, average changes in population levels of common birds to reflect the health and functioning of ecosystems. The **population index of common birds** is an aggregated index (with base year 1990 or the first year the Member State entered the scheme) of population trend estimates of a selected group of common bird species. Indices are calculated for each species independently and are then combined to create a multi-species EU indicator by averaging the indices with an equal weight using a geometric mean. Indices are averaged rather than bird abundance in order to give each species an equal weight in the resulting indicator. The EU index is based on trend data from 18 Member States, derived from annually operated national breeding bird surveys obtained through the pan-European common bird monitoring scheme (PECBMS). Three different indices are presented, covering: farmland (36 species), forest (29 species) and 'all common birds' (135 species). For the first two categories, the bird species have a high dependence on the habitats in the nesting season and for feeding during most of the year; the aggregate index regroups farmland and forest species together with other common species.

Main findings

Protected areas for biodiversity are based on areas proposed by countries under the Habitats Directive and reflect the share of the total area of a country. About 13 % of the EU-25's territory was considered as a protected area in 2007, but individual Member States can have a much higher share, for example, a little above 30 % in Slovenia.

There was a negative trend in the past 25 years for common bird species, in particular for common farmland birds, which have become more threatened during the period considered. Part of the relatively steep decline in numbers of common farmland bird species may be explained by changes in land use and agricultural practices which affect birds' capacity for nesting or feeding. After a couple of years of limited upturn, the population of farmland species fell relatively sharply again in 2006. In contrast, the index for forest birds showed some improvement compared with its relative low recorded in 2000, despite a contraction between 2004 and 2005.

Figure 12.14: Protected areas for biodiversity: habitats Directive, 2007 (1)

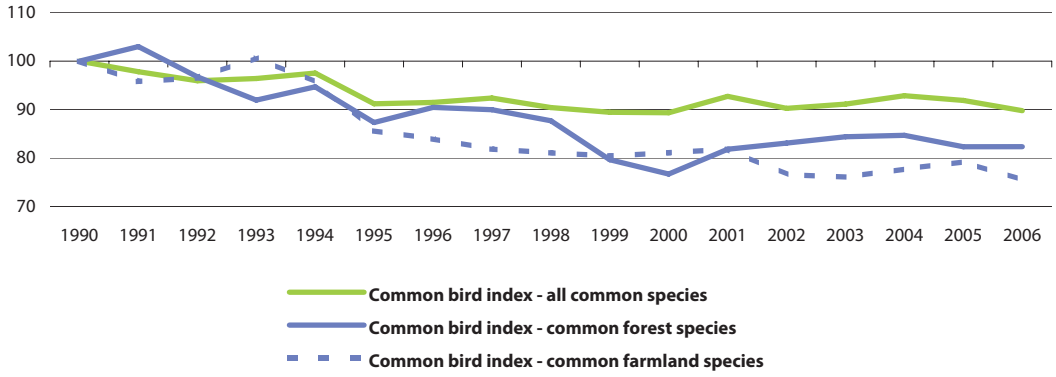


(1) Bulgaria and Romania, not available.

Source: EEA/European Topic Centre on Biodiversity, Eurostat (env_bio1)

Figure 12.15: Common bird indices, EU (1)

(aggregated index of population estimates of a selected group of breeding bird species dependent on agricultural land for nesting or feeding, 1990=100)



(1) Based on information for Belgium, Bulgaria, the Czech Republic, Denmark, Germany, Estonia, Ireland, Spain, France, Italy, Latvia, Hungary, the Netherlands, Austria, Poland, Portugal, Finland, Sweden and the United Kingdom; 'all common species' covers information on 135 different bird species; 'common farmland species' covers 36 bird species; 'common forest species' covers 29 bird species.

Source: EBCC/RSPB/BirdLife/Statistics Netherlands, Eurostat (env_bio2)