national STATISTICS

Environmental Accounts

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About the Office for National Statistics

The Office for National Statistics (ONS) is the government agency responsible for compiling, analysing and disseminating many of the United Kingdom's economic, social and demographic statistics, including the retail prices index, trade figures and labour market data, as well as the periodic census of the population and health statistics. The Director of ONS is also the National Statistician and the Registrar General for England and Wales, and the agency that administers the registration of births, marriages and deaths there.

A National Statistics Publication

National Statistics are produced to high professional standards set out in the National Statistics Code of Practice. They undergo regular quality assurance reviews to ensure that they meet customer needs. They are produced free from any political influence.

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Executive Summary

This edition of Environmental Accounts (publication date 3rd December 2007) contains new and revised information on natural resources, UK oil and gas reserves, forestry, environmental taxes and environmental protection expenditure by industry.

The main findings in the latest edition of Environmental Accounts are: -

- **Material Flows**. In 2006, the quantity of natural resources used by the UK economy, known as domestic material consumption, fell by 6 million tonnes (0.9 per cent) to 680 million tonnes. However, broadly resource use remains unchanged, despite rising levels of economic activity. The components of domestic material consumption are:

  Domestic extraction which declined by 3.6 per cent to 562 million tonnes.
  Imports, which rose 4.3 per cent between 2005 and 2006, to a record 292 million tonnes.
  Exports, which fell 1.7 per cent to 174 million tonnes between 2005 and 2006.

- **Oil and Gas Reserves**. The latest oil and gas data for 2006 shows that UK reserves of oil were estimated to be around 2.9 billion tonnes, whilst UK gas reserves were around 2016 billion cubic metres. Of these, proven reserves of oil were 0.5 billion tonnes and proven reserves of gas were 412 billion cubic metres. Compared with a year earlier, proven reserves were 7.2 per cent lower for oil and 14.3 per cent lower for gas. The monetary value of oil reserves increased from £100.1 billion in 2005 to £114.2 billion in 2006, a rise of 14.1 per cent reflecting rising oil prices. At £85.3 billion, the value of gas reserves increased by 30.4 per cent from £65.4 billion between 2005 and 2006.

- **Forestry**. In 2006, 11.6 per cent of the UK's land area was covered by woodland. Between 2005 and 2006, the consumption of wood products fell; sawnwood (3.3 per cent), paper (1.5 per cent) and woodbased panels (1.3 per cent). It should be noted that the longer term trend shows a rise in all components of apparent consumption of wood products.

- **Environmental Taxes**. In 2006, government revenue from environmental taxes was £35.4 billion. As a proportion of GDP this amounts to 2.7 per cent and as a proportion of total taxes and social contributions environmental taxes were 7.3 per cent in 2006. These proportions are lower than in previous years because growth in the economy and total taxes and social contributions has exceeded that of environmental taxes.

- **Environmental Protection Expenditure by industry**. Environmental protection expenditure by all industries amounted to £3.4 billion in 2005, within this the two largest domains of expenditure were waste and wastewater management.

The next edition of *Environmental Accounts* will be published in June 2008.

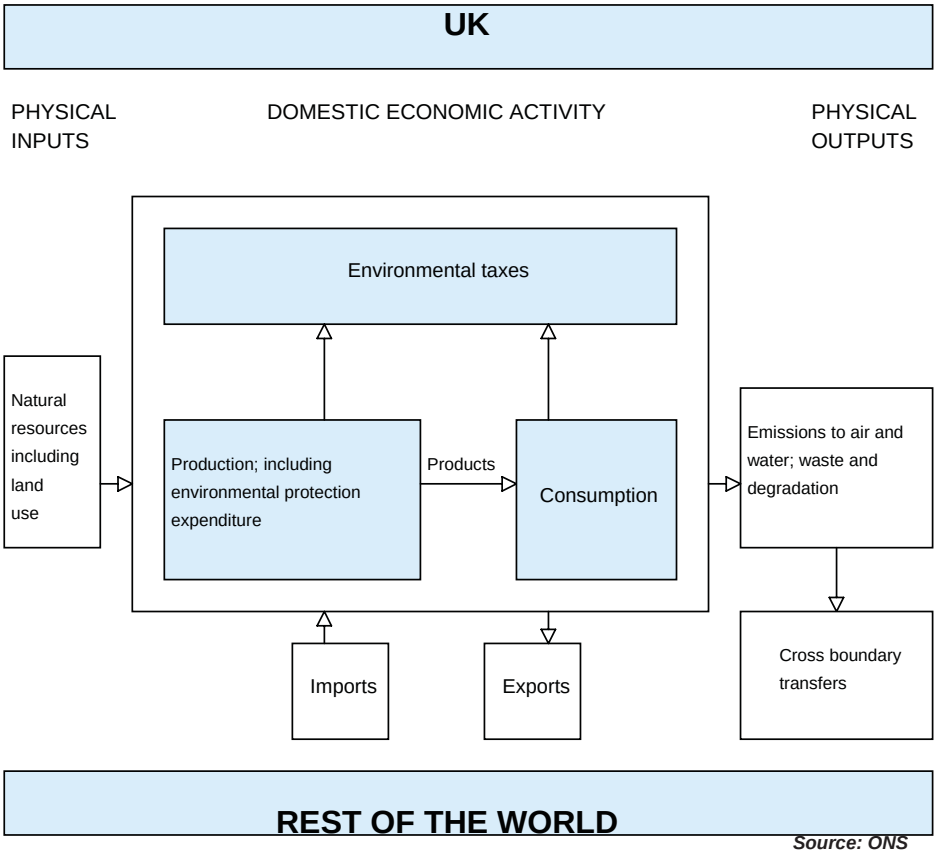
Introduction to environmental accounting

The Environment

"The effect of mankind's activity upon the environment has been an important policy issue throughout the last part of the twentieth century. On the one hand there has been growing concern about the impact of each country's economic activity upon the global and local environment. On the other hand there has been increasing recognition that continuing economic growth and human welfare are dependent upon the services provided by the environment. These services include the provision of raw materials and energy used to produce goods and services, the absorption of waste from human activities, and the basic roles in life support and the provision of other amenities such as landscape."

Source: The United Nations Handbook of National Accounting - Integrated Environmental and Economic Accounting

Economic activity and environmental impact



Source: ONS

UK Environmental Accounts

UK Environmental Accounts provide information on the demands that UK economic activity places on the environment (in particular in the form of emissions of pollutants) and on the importance of natural resources to the economy. The information has been separated into three dimensions:

Natural resources

- Oil and gas extraction and reserves - providing information in physical and monetary terms
- Land cover - reporting on the amount and condition of habitats and landscapes in Great Britain
- Forestry - providing information on woodland area, diversity and consumption of wood products in Great Britain
- Fishing - giving information on selected catches and stocks in three sea regions

Physical flows

- Fossil fuel and energy consumption - a breakdown of fossil fuel use and energy consumption by industry
- Atmospheric emissions - a breakdown of greenhouse gas and acid rain precursor emissions by industry
- Material flows - presents information on the total mass of natural resources and products that are used by the UK
- Waste - estimating the total waste arising in the UK, including information on radioactive waste
- Water - showing amounts of ground water and non-tidal surface water used by UK industry

Monetary

- Environmental taxes - information on government revenue from environmental taxes
- Environmental protection expenditure - a breakdown of environmental protection expenditure by general government and UK industry

UK environmental accounts are used to inform sustainable development policy, to model impacts of fiscal or monetary measures and to evaluate the environmental impacts of different sectors of the economy. Most data are provided in units of physical measurement (mass or volume), although some are in monetary units, where this is the most relevant or the only data available.

Satellite Accounts

Environmental Accounts are “satellite accounts” to the main National Accounts. Satellite accounts are extensions to National Accounts, which facilitate analysis of the wider impact of economic change. The Environmental Accounts use similar concepts and classifications of industry to those employed in the National Accounts and they reflect frameworks recommended by European Union and United Nations for developing such accounts.

Other publications

Office for National Statistics

United Kingdom National Accounts Blue Book:
http://www.statistics.gov.uk/downloads/theme_economy/Blue_Book_2007_web.pdf

Department for Environment, Food and Rural Affairs

The Environment in your Pocket 2006:
http://www.sustainable-development.gov.uk/progress/documents/sdiyp2006_a6.pdf
e-Digest of Environmental Statistics:
http://www.defra.gov.uk/environment/statistics/index.htm
Sustainable Consumption and Production Indicators:
http://www.sustainable-development.gov.uk/progress/index.htm

Sustainable development

Securing the future - UK Government Sustainable Development Strategy
http://www.sustainable-development.gov.uk/publications/uk-strategy/index.htm
UK Government Sustainable Development Strategy Indicators:
http://www.sustainable-development.gov.uk/progress/national/consumption-production.htm

Eurostat

Energy, transport and environment data
http://epp.eurostat.ec.europa.eu/portal/page?_pageid=0,1136239,0_45571447&_dad=portal&_schema=PORTAL

Natural resource accounts

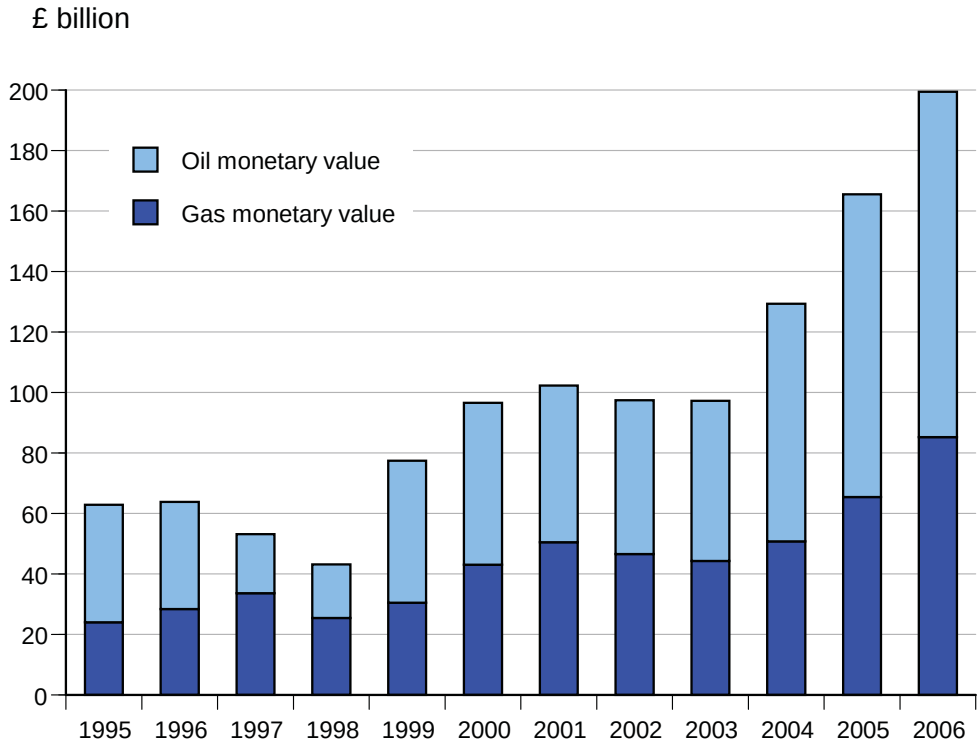
1.1 Estimates of remaining recoverable oil and gas reserves

		1995	1998	1999	2000	2001	2002	2003	2004	2005	2006
Oil (Million tonnes)											
Reserves											
Proven	JKOV	605	685	665	630	605	593	571	533	516	479
Probable	JKOW	765	575	455	380	350	327	286	283	300	298
Proven plus Probable	JKOX	1 370	1 260	1 120	1 010	955	920	857	816	816	776
Possible	JKOY	520	540	545	480	475	425	410	512	451	478
Maximum	JKOZ	1 890	1 800	1 665	1 490	1 430	1 344	1 267	1 328	1 267	1 254
Range of undiscovered resources											
Lower	JKNY	380	275	250	225	205	272	323	396	346	438
Upper	JKNZ	2 920	2 550	2 600	2 300	1 930	1 770	1 826	1 830	1 581	1 637
Range of total reserves											
Lower[1]	JKOA	985	960	915	855	810	865	894	929	862	917
Upper[2]	JKOB	4 810	4 350	4 265	3 790	3 360	3 115	3 093	3 158	2 848	2 892
Expected level of reserves[3]											
Opening stocks	JKOC	1 975	1 675	1 535	1 370	1 235	1 160	1 192	1 180	1 212	1 162
Extraction[5]	JKOD	–130	–132	–137	–126	–117	–117	–106	–95	–85	–77
Other volume changes	JKOE	–95	–8	–28	–9	42	149	94	127	35	130
Closing stocks	JKOF	1 750	1 535	1 370	1 235	1 160	1 192	1 180	1 212	1 162	1 215
Life expectancy[4] (years)	JKOG	13	12	10	10	10	10	11	13	14	16
Gas (billion cubic metres)											
Reserves											
Proven	JKOH	700	755	760	735	695	628	590	531	481	412
Probable	JKOI	780	585	500	460	445	369	315	296	247	272
Proven plus Probable	JKOJ	1 480	1 340	1 260	1 195	1 140	998	905	826	728	684
Possible	JKOK	435	455	490	430	395	331	336	343	278	283
Maximum	JKOL	1 915	1 795	1 750	1 630	1 535	1 329	1 241	1 169	1 006	967
Range of undiscovered resources											
Lower	JKOM	395	440	355	325	290	238	279	293	226	301
Upper	JKON	1 412	1 595	1 465	1 440	1 680	1 386	1 259	1 245	1 035	1 049
Range of total reserves											
Lower[1]	JKOO	1 095	1 195	1 115	1 060	985	866	869	824	707	713
Upper[2]	JKOP	3 327	3 390	3 215	3 065	3 215	2 714	2 500	2 415	2 041	2 016
Expected level of reserves[3]											
Opening stocks	JKOQ	1 945	1 885	1 780	1 615	1 520	1 430	1 235	1 184	1 120	954
Extraction[5]	JKOR	–70	–89	–99	–108	–104	–102	–102	–95	–86	–78
Other volume changes	JKOS	–	–16	–66	13	14	–93	51	31	–80	109
Closing stocks	JKOT	1 875	1 780	1 615	1 520	1 430	1 235	1 184	1 120	954	985
Life expectancy[4] (years)	JKOU	27	20	16	14	14	12	12	12	11	13

1 The lower end of the range of total reserves has been calculated as the sum of proven reserves and the lower end of the range of undiscovered reserves.
2 The upper end of the range of total reserves is the sum of proven, probable and possible reserves and the upper end of the range of undiscovered reserves.
3 Expected reserves are the sum of proven reserves, probable reserves and the lower end of the range of undiscovered reserves.
4 Based on expected level of reserves at year end and current extraction rates (source: ONS).
5 Negative extraction is shown here for the purposes of the calculation only. Of itself, extraction should be considered as a positive value.

Source: ONS and Department for Business Enterprise & Regulatory Reform

Value of oil and gas reserves 1995 to 2006



Source: Department of Business Enterprise and Regulatory Reform

At the end of 2006 (the latest date for which estimates are currently available), oil reserves were valued at £114.2 billion. This is an increase of 14.0 per cent since 2005, when the value of reserves stood at £100.1 billion. Since 1995 the nominal value of oil reserves has tripled from £38.9 billion.

In 2006, gas reserves were estimated to be worth £85.2 billion, up from £65.4 billion in 2005 and representing a year on year increase of 30.4 per cent. The nominal value of gas reserves has increased almost fourfold since 1995 when it stood at £24.0 billion.

The value of the UK's recoverable oil and gas reserves mainly depend upon the estimated physical amounts remaining, the rate of extraction and the assumed future price per unit of oil or gas, net of the cost of extraction.

These factors show that, since 1994 the estimated remaining physical stock of reserves has fallen as a result of extraction, but the value of the reserves has generally risen, with values being particularly sensitive to fluctuations in the price of oil and gas.

Expressing UK oil and gas reserves in monetary terms allows these subsoil assets to be compared with other economic entities. This provides a means for the commercial depletion of subsoil assets to be set against national income.

Last updated December 2007.

1.2 Oil and gas monetary balance sheet

£ million

		1995	1998	1999	2000	2001	2002	2003	2004	2005	2006
Oil											
Opening stocks[1]	JKPA	26 209	19 486	17 737	46 919	53 586	51 827	50 883	53 017	78 521	100 138
Extraction[2]	JKPB	–3 785	–2 001	–5 922	–6 875	–6 580	–6 326	–6 163	–8 258	–10 028	–10 369
Revaluation due to time passing	JKPC	1 700	898	2 415	2 734	2 558	2 333	2 523	3 657	4 921	5 297
Other volume changes	JKPD	–1 579	–64	–734	–295	1 467	5 051	3 237	6 101	2 133	8 424
Change in extraction	JKPE	276	175	448	–1 141	–961	–	–1 290	–2 252	–3 457	–3 479
Change in rent	JKPF	15 326	–1 273	32 576	11 625	594	–3 599	2 254	24 877	26 288	11 483
Nominal holding gains	C3OC	695	518	399	619	1 164	1 597	1 574	1 378	1 760	2 673
Closing stocks	JKPG	38 842	17 737	46 919	53 586	51 827	50 883	53 017	78 521	100 138	114 166
Gas											
Opening stocks	JKPH	15 370	33 632	25 416	30 483	42 985	50 458	46 566	44 229	50 753	65 364
Extraction[2]	JKPI	–1 479	–1 989	–2 704	–4 219	–5 049	–5 091	–4 977	–5 632	–7 618	–8 968
Revaluation due to time passing	JKPJ	978	1 259	1 554	2 141	2 514	2 466	2 163	2 510	3 497	3 871
Other volume changes	JKPK	3	–135	–803	256	359	–2 501	1 422	1 025	–4 020	7 053
Change in extraction	JKPL	943	409	1 288	1 334	–552	–355	–37	–1 072	–1 940	–1 542
Change in rent	JKPM	7 733	–8 653	5 159	12 588	9 269	34	–2 348	8 543	23 554	17 728
Nominal holding gains	C3OB	408	893	572	402	933	1 555	1 440	1 150	1 138	1 745
Closing stocks	JKPN	23 956	25 416	30 483	42 985	50 458	46 566	44 229	50 753	65 364	85 252

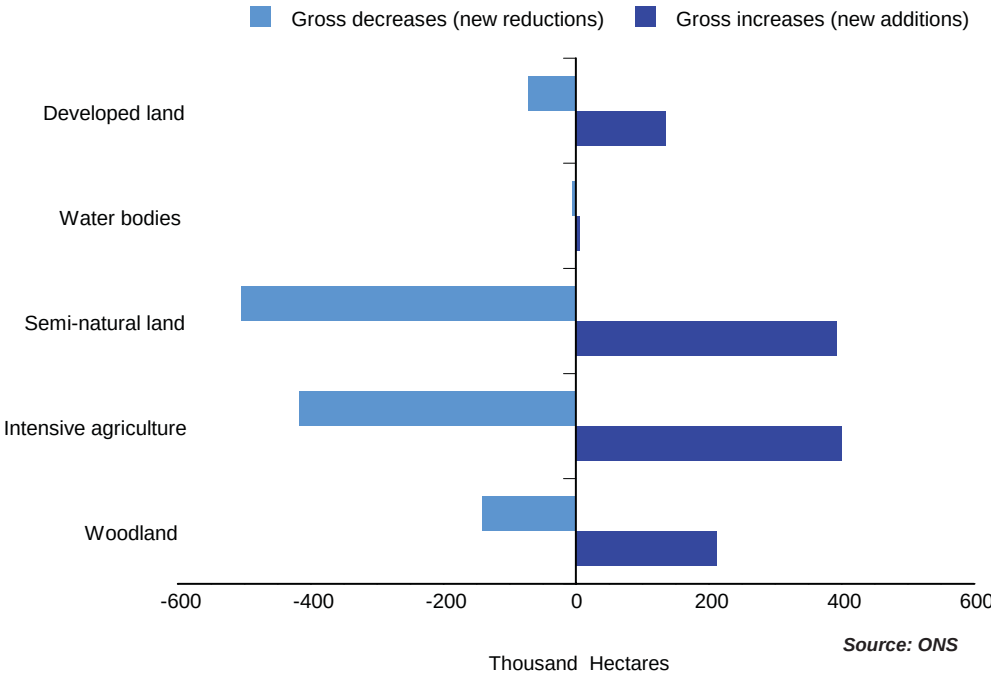
1 The estimated opening and closing stock values are based on the present value method -see *Environmental Accounts* on the National Statistics web-site for more detailed descriptions of the methodology used. The estimates are extremely sensitive to the estimated return to capital and to assumptions about future unit resource rents.

2 Negative extraction is shown here for the purposes of the calculation only. Of itself, extraction should be considered as a positive value.

Source: ONS

Land cover

Gross changes of land cover in Great Britain, between 1990 and 1998



Source: ONS

Total land cover for Great Britain is 23.5 million hectares. Different types of land-cover give distinctive qualities to an area and can have important climatic effects. For instance the urban “heat island” effect raises temperatures in urban areas compared with the surrounding countryside.

The most recent data show that developed land accounts for 1.8 million hectares, water bodies 0.3 million hectares, semi-natural land 7 million hectares, intensive agricultural land 10.8 million hectares and woodland 2.8 million hectares. The chart shows how these different types of land cover changed between 1990 and 1998. Most notably there is a net increase in the area of woodland of 200 thousand hectares, an increase of 2.1 per cent and a net decrease in the area of semi-natural land of 90 thousand hectares a fall of 1.5 per cent.

Last updated 2002.

1.3 Land cover account, Great Britain
Changes between 1990 and 1998

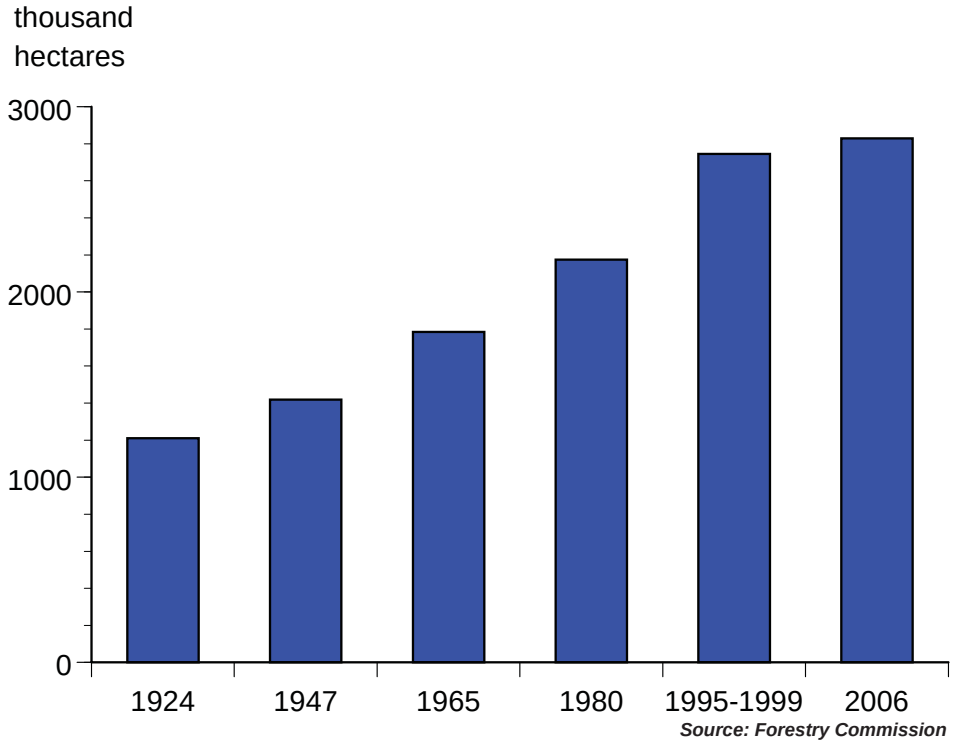
Area measured in thousand hectares

	1990 stock	Types of changes in stock: Woodland creation/ rotation	Agricultural intensifica-tion/rotation	Semi-natural creation	Semi-natural rotation	Water body creation	Develop-ment	Loss to unknown	1998 stock
Broadleaved and mixed woodland	1 371.2	145.9	–22.2	–42.1	..	–0.8	–12.9	–0.4	1 438.7
Coniferous woodland	1 369.3	53.7	–9.0	–48.3	..	–0.6	–5.0	–	1 360.2
Woodland sub-total	**2 740.5**	**199.6**	**–31.2**	**–90.4**	..	**–1.4**	**–17.8**	**–0.4**	**2 798.9**
Arable and horticultural	5 246.1	–28.8	177.4	–41.4	..	–1.0	–19.3	–0.2	5 332.9
Improved grassland	5 538.6	–34.1	222.8	–232.0	..	–0.5	–53.9	–5.3	5 435.5
Intensive agriculture sub-total	**10 784.7**	**–62.8**	**400.2**	**–273.4**	..	**–1.5**	**–73.2**	**–5.5**	**10 768.4**
Neutral grassland	569.5	–24.4	–153.6	238.9	–18.2	–0.5	–33.2	–0.1	578.3
Calcareous grassland	81.4	–1.1	–13.3	3.7	–3.8	–	–0.2	–	66.7
Acid grassland	1 470.9	–24.0	–133.7	43.3	–34.7	–	–4.6	–0.7	1 316.5
Bracken	456.9	–21.8	–8.7	20.4	38.9	–	–0.5	–	485.1
Dwarf shrub heath	1 487.1	–24.5	–1.2	13.1	–41.4	–	–3.3	–	1 429.7
Fen, marsh, and swamp	456.4	–6.1	–25.1	61.0	71.3	–0.7	–1.2	–0.6	554.9
Bog	2 297.3	–17.9	–0.7	10.5	–10.1	–0.3	–0.2	–0.1	2 278.5
Montane	49.8	–	–	–	–	–	–	–	49.8
Coastal habitats	274.1	–0.3	–0.8	2.6	–2.0	–0.3	–	–	273.3
Semi-natural sub-total	**7 143.3**	**–120.1**	**–337.2**	**393.5**	**–**	**–1.8**	**–43.2**	**–1.5**	**7 032.9**
Standing open water and canals	208.4	–0.2	–1.0	–0.9	..	5.2	–1.2	–	210.3
Rivers and streams	66.7	–0.2	–0.1	–1.4	..	0.3	–0.1	–	65.2
Water bodies sub-total	**275.1**	**–0.4**	**–1.1**	**–2.3**	..	**5.5**	**–1.2**	**–0.1**	**275.5**
Inland rock	53.6	–0.6	–2.2	–7.6	..	–	17.0	–	60.2
Built up areas and gardens	1 230.4	–14.2	–12.3	–9.4	..	–0.7	98.3	–1.2	1 291.0
Boundary and linear features	495.0	–1.0	–14.5	–7.8	..	–0.1	20.2	–0.1	491.7
Developed sub-total	**1 779.0**	**–15.9**	**–28.9**	**–24.8**	..	**–0.8**	**135.5**	**–1.3**	**1 842.9**
Sea	298.5	–	–	–0.7	..	–	–	–	297.8
Unknown	73.9	–0.3	–1.8	–2.0	..	–	–	8.8	78.6
Unsurveyed urban land	463.0	..	..	..	..	..	..	..	463.0
Total	**23 557.9**	..	..	..	..	..	..	..	**23 558.0**

Areas that are more than 75% built up were not covered by the Countryside 2000 survey

Source: Department for Environment Food and Rural Affairs

Woodland area, diversity and production in the United Kingdom



Source: Forestry Commission

The area of woodland in the UK has more than doubled since its lowest level of 5 per cent at the start of the 20th Century. Much of the increase over this period came from new commercial conifer plantations created between the 1950s and 1980s, especially in upland areas of Scotland. These factors have seen woodland cover in 2005 increase to 2825 thousand hectares[1], or 12 per cent[2] , of the UK land area. Between 2001-2 and 2004-5 new woodland was established at the rate of 10-15 thousand hectares per year.

In the 1990s the Kyoto Protocol to the UN Framework Convention on Climate Change recognised the place of forestry in reducing concentrations of greenhouse gases and the Convention on Biological Diversity affirmed the role of forests in the promotion of greater variety of life[3].

Plants absorb carbon dioxide (CO_2) and store the carbon, so they can help to reduce the CO_2 concentration in the atmosphere. Processes that lock up carbon are known as carbon sequestration. The value of offsetting emissions by sequestration is controversial, but there is widespread international agreement that the store of carbon represented by forest ecosystems should be protected and enhanced. The amount of carbon in tree wood varies with the volume of growing stock and tree species; the rate of carbon take-up by woodland depends upon the species and age of trees. There is currently around 140 million tonnes of carbon stored in UK woodland, with a net addition of 2 million tonnes of carbon each year.

Last updated December 2007

1. 1 hectare is 10,000 square metres or 2.471 acres.

2. http://www.forestry.gov.uk/website/foreststats.nsf/byunique/woodland.htm

3. Convention on Biological Diversity, Sustaining life on Earth: How the Convention on Biological Diversity promotes nature and human well being*, pp 6, downloaded 20/3/2003 www.biodiv.org/doc/publications/guide.asp*

1.4 UK production, imports and exports of wood products[1]

		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Sawnwood(thousand m3)														
UK production	**ALV3**	2 461	2 446	2 495	2 529	2 515	2 651	2 622	2 711	2 705	2 742	2 772	2 770	2 895
Imports	**ALV4**	7 846	5 510	5 918	7 102	6 969	7 014	7 852	7 801	8 201	8 714	8 653	8 223	7 748
Exports	**ALV5**	69	66	64	93	135	152	195	210	293	356	371	358	365
Apparent consumption[2]	**ALV6**	10 238	7 890	8 348	9 538	9 350	9 514	10 280	10 302	10 614	11 101	11 054	10 634	10 278
Woodbased Panels(thousand m3)														
UK production	**ALV7**	2 210	2 533	2 609	2 640	2 727	2 974	3 275	3 255	3 217	3 361	3 533	3 398	3 498
Imports	**ALV8**	3 566	3 246	2 916	2 872	3 060	3 031	3 307	3 598	3 782	3 492	3 813	3 552	3 384
Exports	**ALV9**	279	346	390	321	269	383	345	362	424	531	519	520	539
Apparent consumption	**ALW2**	5 497	5 432	5 135	5 191	5 517	5 622	6 236	6 491	6 575	6 322	6 827	6 429	6 344
Paper(thousand tonnes)														
UK production	**ALW3**	5 829	6 093	6 189	6 481	6 477	6 576	6 605	6 204	6 218	6 226	6 240	6 039	5 589
Imports	**ALW4**	5 608	6 295	6 546	7 098	6 725	7 079	6 668	7 322	7 072	7 490	7 528	7 663	7 756
Exports	**ALW5**	1 048	1 327	1 352	1 673	1 790	1 781	1 759	1 623	1 546	1 697	1 557	1 164	1 001
Apparent consumption	**ALW6**	10 389	11 061	11 383	11 906	11 413	11 875	11 514	11 903	11 744	12 019	12 210	12 538	12 344

1 Excludes other wood products, e.g. fuelwood
2 Apparent consumption is equal to production plus imports less exports
Components may not sum due to rounding

Sources: Forestry Commission; UK Forest Products Association; Wood Panel Industries Federation; Confederation of Paper Industries; HM Revenue and Customs: Overseas trade statistics

The following outlines both year on year and longer term trends in the UK production, imports and exports of specific wood products.

Year on year imports of sawnwood fell 5.8 per cent from 8,223 to 7,748 thousand cubic metres leading to a fall in apparent consumption of sawnwood of 3.3 per cent between 2005 and 2006. Sawnwood is timber that has been cut into planks from logs and includes both softwood and hardwood.

Year on year apparent consumption of wood based panels fell from 6,429 thousand cubic metres in 2005 to 6,344 thousand cubic metres in 2006. This decrease of 1.3 per cent was driven by reduced consumption particularily reflected in lower levels of imports. Woodbased panels include particle board, fibreboard, plywood and veneer sheets and can be made from softwood or hardwood.

Between 2005 and 2006, apparent consumption of paper fell 1.5 per cent from 12,538 thousand tonnes to 12,344 thousand tonnes. This was driven by lower levels of consumption that are reflected in the falls seen in production and exports levels.

It should be noted that data are subject to annual fluctuation and the longer term trend shows a rise in all components of apparent consumption of wood products. Between 1994 and 2006, apparent consumption of sawnwood, that is UK production plus imports less exports, rose 0.4 per cent to 10,278 thousand cubic metres. Consumption of wood based panels rose by 15.4 per cent between 1994 and 2006. Since 1994 apparent consumption of paper has risen 18.8 per cent. Over the same period, the gross value added of the wood industry (SIC92) has risen by 78.1 per cent at current prices.

In recreational terms, woodland is an important resource. The last GB- wide survey (GB Day Visits Survey 2002-3, TNS Travel and Toursim) estimated that there were around 250 million woodland leisure visits from in that year, but survey estimates have varied with changes in scope and methodolgy. Woodland also makes less quantifiable improvements to quality of life such as enhancing the appearance of the landscape and providing a good habitat for wildlife.

Fig. 1 Changes in the market value of UK Woodland between 1993 and 2003.

	1993	**1998**	**2003**
Woodland area (1000 ha.)	2668	2758	2807
Market value of woodland area(£m)	4274	4902	2922

Source: Forestry Commission

The total estimated market value of UK woodland in 2003 was £2.9 billion. This estimate is derived by using open market values of Forestry Commission woodland, assessed by valuation panels including external advice, which are applied to all woodland in the United Kingdom. A major factor in variations in woodland value is changes in standing timber price, which are in turn affected by traded wood products (especially sawnwood). Traded wood product prices are influenced by exchange rates and availability of low cost timber from the Baltic states. This open market valuation exercise takes place at five yearly intervals.

Last updated December 2007

Fish Stocks

UK catches of the selected stocks, 2001

Fishing area	Species	Total catch in 2001 (tonnes)[1]	UK catch in 2001 (tonnes)[2]	UK catch as % of total catch	Total value of UK catch in 2001[2] (£ million)
North Sea and Eastern English Channel	cod	49,693	19,931	40.1	28.19
	haddock	167,000	32,544	19.5	26.20
	whiting	46,640	19,168	41.1	8.38
Western English Channel	sole	965	384	39.8	7.66
	plaice	967	784	81.1	2.66
Irish Sea	cod	3,875	917	23.7	1.43
	whiting	1,745	531	30.4	0.30
	sole	1,473	618	42.0	0.50
	plaice	1,053	198	18.8	1.17
Total of selected stocks		**273,411**	**75,075**	**27.5**	**76.49**
Total UK catch		**737,802**	**-**	**574.38**	

Source: UK Sea Fisheries Statistics 2001*;*International Council for the Exploration of the Sea Working Groups

An ONS report published in May 2003 looked to construct physical and economic accounts for UK fisheries. The report looked at three sea regions of the UK:

- The North Sea and Eastern English Channel
- Western English Channel
- Irish Sea

and a combination of five species of fish

- Cod
- Plaice
- Sole
- Whiting
- Haddock

The results for each selected stock are summarised below, with all physical accounts dating from 1981 to 2000 and economic accounts dating from 1991 to 2001 and using individually estimated stock costs.

- In the North Sea and Eastern English Channel, stocks of cod and whiting in 2000 were only 33 and 44 per cent of the level that they were in 1981, respectively, while haddock stocks in 2000 were two and a half times higher compared to levels in 1981;
- In the English Channel, the stocks of sole and plaice have both significantly declined from 1981 to 2000, by 44 and 41 per cent, respectively;
- In the Irish Sea, the stocks of cod, plaice and sole all peaked in the 1980s before declining throughout the 1990s. Between 1981 and 1999, the levels of cod and whiting have fallen by 79 and 84 per cent, respectively, while the levels of plaice and sole have fallen by a much smaller 8 and 19 per cent, respectively.

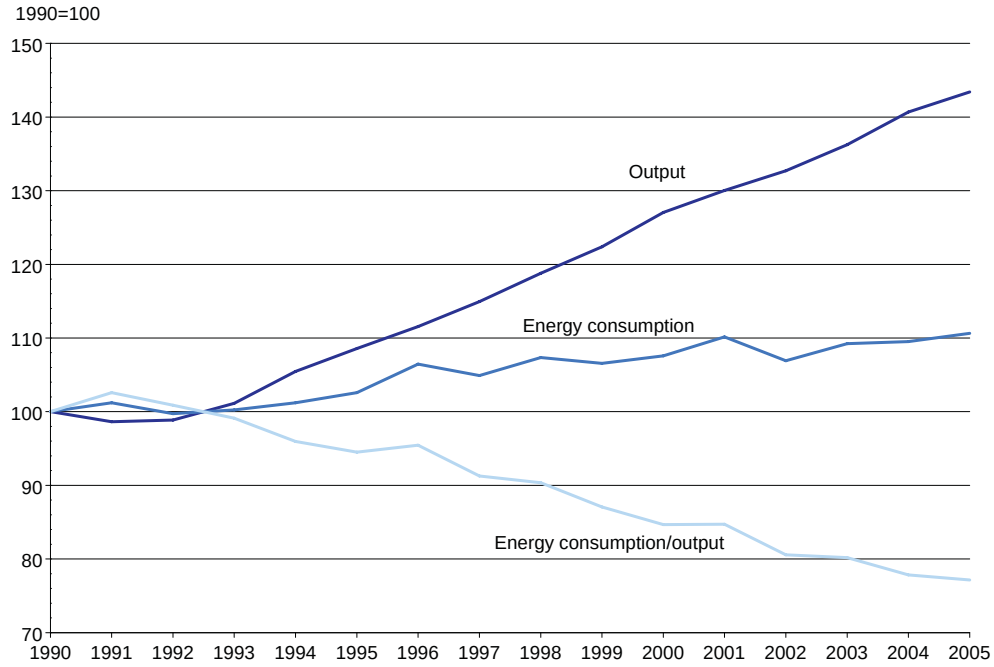
The full UK fisheries report can be found on the National Statistics website at: http://www.nationalstatistics.gov.uk/downloads/theme_environment/UKfisheries_accounts.pdf

Last updated May 2003.

Physical flows

Energy consumption

Non-domestic energy consumption and output (Gross Domestic Product, Chained Volume Measure) 1990 to 2005



Source: ONS

Energy consumption, including electricity, by non-household sectors of the UK economy increased by 10.6 per cent between 1990 and 2005, while output (Gross Domestic Product) rose by 43.6 per cent in real terms. As a result, energy intensity (energy consumed per unit of output) has decreased by 22.9 per cent over the same period.

Referring to table 2.1 Energy consumption (top section):

- Total non-household use of energy from carbon fuels has increased from 148.9 million tonnes of oil equivalent (mtoes) in 1990 to 165.7 mtoes in 2005 representing a rise of 11.3 per cent.

- As a percentage of total energy consumption of primary fuels and equivalents, total non-domestic energy from carbon fuels has increased slightly from 67.5 per cent in 1990 to 67.7 per cent in 2005.

- The direct use of energy is highest in the electricity, gas and water industry, which in 2005 accounted for 27.0 per cent of all energy derived from carbon fuels. The manufacturing industries accounted for 16.9 per cent and the transport and communication industries accounted for 15.7 per cent of energy derived from carbon fuels.

Referring to table 2.1 Energy Consumption (bottom section):

- In 2005, the non-domestic sector accounted for 65.9 per cent and the domestic sector accounted for 34.1 per cent of energy use after transformation losses and distribution losses of electricity supply are allocated to the final consumer. A figure that has remained broadly unchanged throughout the period 1990 to 2005.

The percentage of energy derived from renewable sources was 1.9 per cent in 2005 compared with 1.7 per cent a year earlier and 0.9 per cent in 1990.

Last updated Jul 2007

2.1 Energy Consumption

Million tonnes of oil equivalent

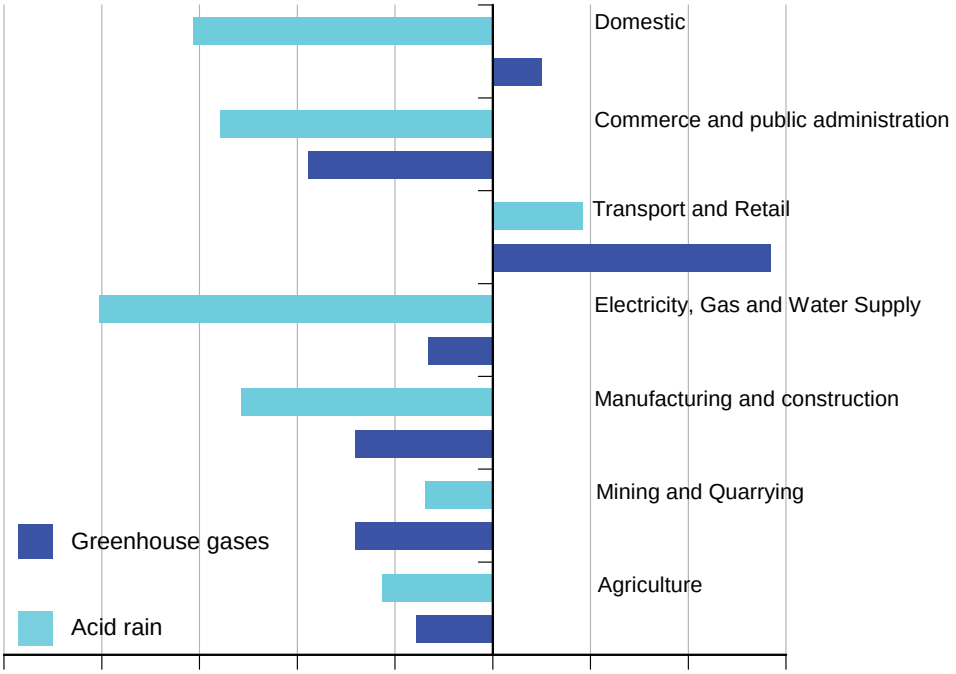
		1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Direct use of energy from carbon fuels													
Agriculture	JKPO	2.3	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.1
Mining and quarrying	JKPP	3.9	4.9	5.6	5.8	6.4	6.3	6.7	7.6	7.5	7.6	7.5	7.3
Manufacturing	JKPQ	42.3	42.1	43.3	43.3	42.3	42.7	42.8	40.9	39.0	39.6	38.2	38.0
Energy, gas and water supply	JKPR	56.8	51.9	52.8	50.2	52.3	51.5	55.2	57.7	56.8	59.5	60.3	60.7
Construction	JKPS	3.0	3.1	3.2	3.3	3.3	3.3	3.3	3.4	3.4	3.5	3.6	3.7
Wholesale and retail trade	JKPT	5.1	5.6	5.8	5.6	5.7	6.0	6.0	5.7	5.5	5.6	5.9	5.8
Transport and communication	JKPU	22.0	24.7	26.9	27.5	28.8	28.6	29.6	30.9	31.1	32.2	34.3	35.4
Other business services	JKPV	2.5	2.6	2.7	2.5	2.6	2.7	2.7	2.8	2.4	2.4	2.4	2.5
Public administration	JKPW	3.8	4.1	4.1	4.0	3.8	3.7	3.4	3.7	3.8	3.5	3.6	3.6
Education, health and social work	JKPX	4.7	4.8	5.2	5.2	5.3	5.4	5.2	5.2	4.5	4.6	4.9	4.8
Other services	JKPY	2.4	2.2	2.3	1.9	1.9	1.9	1.9	2.0	1.7	1.8	1.8	1.8
Households	JKPZ	54.0	54.4	60.5	57.7	58.5	58.7	59.2	60.5	60.0	60.4	61.4	59.3
Total use of energy from carbon fuels	JKQA	**202.9**	**202.7**	**214.6**	**209.2**	**213.1**	**213.2**	**218.0**	**222.9**	**218.1**	**222.9**	**226.0**	**225.0**
Energy from other sources[1]	JKQB	17.7	23.1	24.0	23.8	25.0	24.0	21.4	22.1	21.3	20.6	19.4	19.8
Total energy consumption of primary fuels and equivalents	JKQC	**220.6**	**225.9**	**238.5**	**233.0**	**238.1**	**237.1**	**239.3**	**245.0**	**239.4**	**243.5**	**245.4**	**244.8**
Direct use of energy including electricity													
Agriculture	JKQD	2.6	2.6	2.7	2.7	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.4
Mining and quarrying	JKQE	4.1	5.1	5.8	6.0	6.6	6.5	6.9	7.8	8.0	8.3	8.2	8.2
Manufacturing	JKQF	49.1	49.9	51.4	51.3	50.1	50.7	50.7	48.4	46.8	47.1	45.8	45.7
Electricity, gas and water supply	JKQG	52.6	50.3	51.2	48.4	51.5	49.4	50.0	53.2	51.1	52.8	52.3	52.5
of which - transformation losses by major producers	JKQH	46.5	45.1	45.2	44.0	45.3	43.7	44.0	46.3	44.9	46.4	45.6	46.5
distribution losses of electricity supply	JKQI	2.1	2.5	2.4	2.5	2.4	2.4	2.5	2.7	2.6	2.6	2.6	2.6
Construction	JKQJ	3.1	3.3	3.4	3.4	3.4	3.5	3.5	3.5	3.6	3.7	3.7	3.9
Wholesale and retail trade	JKQK	7.1	7.8	8.1	8.2	8.3	8.6	8.7	8.5	8.4	8.6	8.9	8.9
Transport and communication	JKQL	22.7	25.6	27.8	28.5	29.8	29.7	30.6	32.1	32.2	33.4	35.5	36.6
Other business services	JKQM	4.2	4.5	4.6	4.6	4.7	4.9	5.0	5.2	4.8	4.8	4.8	4.8
Public administration	JKQN	4.4	4.8	4.7	4.6	4.3	4.3	4.0	4.3	4.4	4.2	4.4	4.3
Education, health and social work	JKQO	5.8	6.0	6.5	6.4	6.6	6.7	6.4	6.8	5.7	5.6	5.9	5.9
Other services	JKQP	2.9	2.8	2.7	2.3	2.3	2.2	2.1	2.3	2.0	2.2	2.2	2.1
Households	JKQQ	62.0	63.2	69.7	66.7	67.9	68.2	68.8	70.3	69.9	70.3	71.3	69.4
Total energy consumption of primary fuels and equivalents	JKQR	**220.6**	**225.9**	**238.5**	**233.0**	**238.1**	**237.1**	**239.3**	**245.0**	**239.4**	**243.5**	**245.4**	**244.8**
Reallocated use of energy													
Energy industry electricity tranformation losses and distribution losses and allocated to final consumer													
Agriculture	JKQS	3.2	3.1	3.2	3.1	3.1	3.1	3.0	3.0	3.0	3.0	3.0	2.9
Mining and quarying	JKQT	4.5	5.4	6.1	6.3	6.8	6.7	7.2	8.1	8.7	9.2	9.2	9.5
Manufacturing	JKQU	62.5	61.9	63.3	62.6	61.5	61.6	61.5	59.4	57.3	57.8	56.2	56.3
Electricity, gas and water supply	JKQV	11.1	11.6	12.3	11.1	13.5	12.9	13.5	14.5	13.9	14.2	14.4	13.6
Construction	JKQW	3.3	3.5	3.6	3.6	3.6	3.7	3.7	3.7	3.8	3.9	3.9	4.1
Wholesale and retail trade	JKQX	10.4	11.3	11.7	12.0	12.1	12.3	12.5	12.6	12.5	12.7	12.9	13.2
Transport and communication	JKQY	23.9	27.0	29.2	30.0	31.3	31.1	32.1	33.7	33.7	35.0	37.1	38.2
Other business services	JKQZ	7.2	7.4	7.5	7.7	7.8	8.0	8.3	8.7	8.1	8.2	8.1	8.1
Public administration	JKRA	7.2	6.1	5.8	5.5	5.2	5.2	4.9	5.1	5.1	5.2	5.4	5.4
Education, health and social work	JKRB	7.7	7.9	8.6	8.3	8.5	8.5	8.0	8.5	7.4	7.1	7.4	7.5
Other services	JKRC	3.8	3.7	3.4	2.9	2.7	2.6	2.5	2.8	2.4	2.7	2.7	2.6
Households	JKRD	75.9	77.1	83.9	79.9	81.9	81.5	82.2	84.7	83.5	84.4	85.1	83.4
Total energy consumption of primary fuels and equivalents	JKRE	**220.6**	**225.9**	**238.5**	**233.0**	**238.1**	**237.1**	**239.3**	**245.0**	**239.4**	**243.5**	**245.4**	**244.8**
Energy from renewable sources[2]	JKRF	1.9	2.3	2.1	2.3	2.6	2.8	2.8	3.0	3.3	3.5	4.1	4.6
Percentage from renewable sources	JKRG	0.9	1.0	0.9	1.0	1.1	1.2	1.2	1.2	1.4	1.4	1.7	1.9

1 Nuclear power, hydroelectric power and imports of electricty.

2 Renewable sources include solar power and energy from wind, wave and tide, hydroelectricity, wood, straw and sewage gas. Landfill gas and municipal solid waste combustion have also been included within this definition.

Source: Netcen, Department for Business Enterprise & Regulatory Reform, ONS

Atmospheric emissions of greenhouse gases and acid rain precursors, percentage change from 1990 to 2005



Source: ONS

In *Environmental Accounts* comparisons are made with 1990 because this is the base year used for the Kyoto Protocol targets. However, it should be noted that Environmental Accounts estimates are not on the same basis as estimates used to assess progress towards Kyoto targets. The National Accounts measure includes emissions by UK companies and households abroad and excludes emissions by foreign residents in the UK. For more information see page 28.

Greenhouse gas emissions: Total greenhouse gas emissions on a national accounts basis have fallen by 9.3 per cent since 1990, driven by a 13.4 reduction in emissions from UK companies and the public sector. In contrast, emissions from the household sector have risen by 10.0 per cent since 1990.

In 2005, emissions of greenhouse gases in the United Kingdom were 733.5 million tonnes of CO2 equivilent, 0.2 per cent lower compared with a year earlier. Over the same period, emissions from UK companies and the public sector have risen 0.6 per cent while the household sector emissions have decreased by 2.9 per cent driven by a reduction in emissions related to domestic heating and cooking fuels.

Within the non-domestic sector many industries show small year on year falls in emissions. For example, emissions from mining and quarrying, agriculture and wholesale and retailing all fell between 2004 and 2005. However, emissions from other business services, construction and the transport and communication industry, have increased by 3.7 per cent, 3.1 per cent and 3.0 per cent respectively.

Emissions that cause acid rain: Since 1990 emissions from chemicals that cause acid rain have fallen by 53.8 per cent. Over this period there have been reductions in all industries except transport and communications, which are 26.6 per cent higher.

Between 2004 and 2005, the largest fall in emissions was in the electricity, gas and water industry (15.0 per cent). Emissions from transport and communications industry fell by 1.3 per cent, the first time there has been a fall in emissions from this industry since 2000. This year emissions from households were 61.3 per cent lower than in 1990 mainly reflecting falling emissions from the use of vehicles as a result of cleaner technolgy.

2.2 Atmospheric emissions 2005

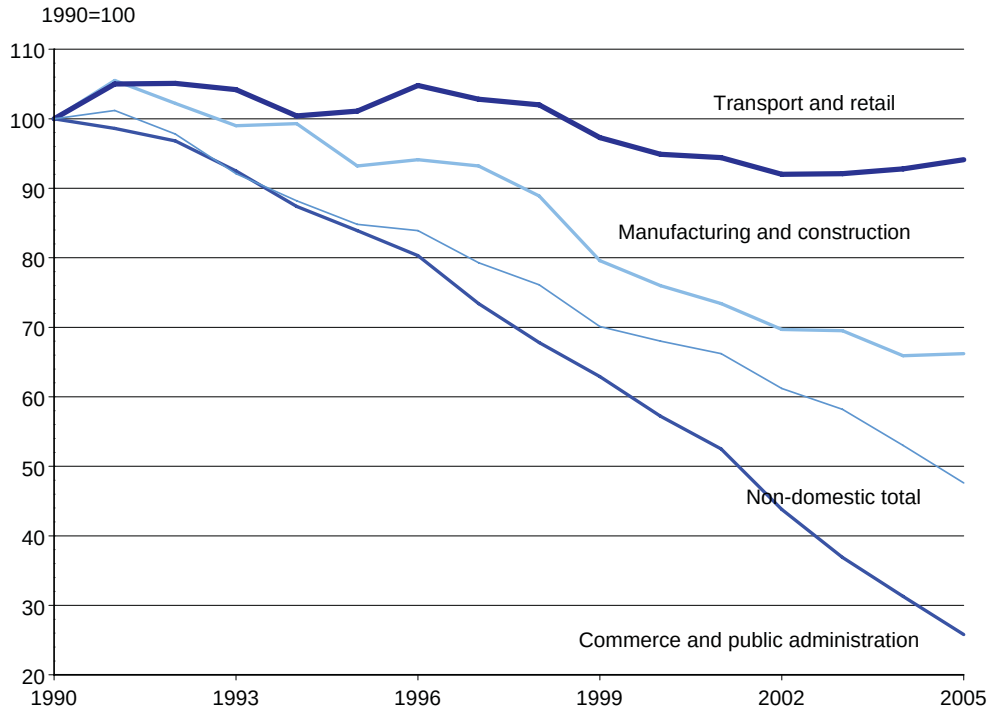
Thousand tonnes

	Greenhouse gases[1]	Acid rain precursors[2]	Emissions affecting air quality							
			PM10[3]	CO[4]	NMVOC[5]	Benzene	Butadiene	Lead	Cadmium (tonnes)	Mercury (tonnes)
Agriculture	51 302	556	22.298	49.073	83.3	0.230	0.088	0.407	0.030	0.032
Mining and quarrying	29 155	87	12.803	38.751	111.9	0.373	0.016	0.264	0.064	0.021
Manufacturing	119 745	437	32.951	573.555	347.3	2.372	0.469	86.698	2.049	3.586
Electricity, gas and water supply	188 216	639	10.089	75.010	49.2	0.522	0.006	9.657	0.709	2.272
Construction	11 302	50	9.504	59.636	65.1	0.248	0.120	0.371	0.042	0.020
Wholesale and retail trade	18 809	54	6.660	75.675	60.9	0.282	0.176	12.901	0.096	0.035
Transport and communication	104 466	1 004	68.972	160.507	58.9	3.617	0.734	4.856	3.716	0.211
Other business services	7 066	14	1.986	52.400	4.7	0.114	0.042	0.144	0.034	0.006
Public administration	9 226	40	2.012	44.452	5.0	0.283	0.055	0.536	0.030	0.044
Education, health and social work	11 029	15	1.096	13.134	2.3	0.059	0.008	0.430	0.021	0.039
Other services	27 159	44	1.507	97.313	29.0	1.798	0.203	0.359	0.030	1.352
Households	155 972	271	36.893	1 258.947	257.2	7.345	0.761	4.843	0.439	0.135
Total	**733 446**	**3 212**	**206.770**	**2 498.454**	**1 075**	**17.243**	**2.677**	**121.5**	**7.261**	**7.752**
of which, emissions from road transport	128 057	415	34.336	1 139.791	121.095	2.942	1.637	2.1	0.420	0.004

1 Carbon dioxide, methane, nitrous oxide, hydro-fluorocarbons, perfluorocarbons and sulphur hexafluoride expressed as thousand tonnes of carbon dioxide equivalent.
2 Sulphur dioxide, nitrogen oxides and ammonia expressed as thousand tonnes of sulphur dioxide equivalent.
3 PM10 is particulate matter arising from various sources including fuel combustion quarrying and construction, and formation of 'secondary' particles in the atmosphere from reactions involving other pollutants sulphur dioxide, nitrogen oxides, ammonia and NMVOCs
4 Carbon monoxide.
5 Non-methane Volatile Compounds, including benzene and 1,3-butadiene.

Source: Netcen

Greenhouse gas emissions per unit of output, 1990-2005



Source: ONS

There were substantial improvements in the level of emissions created per unit of output (emissions intensity), in most sectors of the UK economy between 1990 and 2005.

The greenhouse gases included in this analysis are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.

The largest fall in emissions intensity is in the commerce and public administration sector (including the other business services, other services and education, health and social work). In this sector emissions per unit of output fell by 17.4 per cent between 2004 and 2005. Since 1990, the emissions intensity of commerce and public administration has fallen by almost 75 per cent.

Emissions of greenhouse gases per unit of output from the transport and retail sector broadly increased during the 1990s and only fell below the 1990 level in 1999. In 2005, emissions per unit of output in the transport and retail sector fell 0.2 per cent compared with a year earlier and are now 5.9 per cent lower than in 1990. The manufacturing and construction industries show a small increase (0.3 per cent) in their emissions intensity between 2004 and 2005.

Overall, emissions per unit of output from the non-household sector have fallen 10.4 per cent between 2004 and 2005, following a 12.3 per cent increase in output compared with a 0.6 increase in greenhouse gas emissions over the same period. They are now 52.4 per cent below their 1990 level.

Last updated Jul 2007

2.3 Greenhouse gas and acid rain precursor emissions

Thousand tonnes

		1990	1995	1997	1999	2000	2001	2002	2003	2004	2005
Greenhouse gases - CO2,CH4,N2O,HFC,PFCs and SF6[1]											
Agriculture	JKRH	60 737	58 581	59 719	57 797	55 581	52 603	52 938	52 545	52 326	51 302
Mining and quarrying	JKRJ	40 554	37 103	36 581	32 462	31 958	31 118	31 578	30 891	30 279	29 155
Manufacturing	JKRK	173 414	159 153	164 436	140 790	136 609	130 999	122 466	123 796	120 037	119 745
Electricity, gas and water supply	JKRL	216 921	177 712	162 955	158 571	170 305	181 971	177 093	185 228	185 453	188 216
Construction	JKRM	8 973	9 513	9 943	10 217	10 249	10 429	10 523	10 750	10 964	11 302
Wholesale and retail trade	JKRN	13 834	15 807	16 806	18 638	19 064	18 433	18 281	18 401	19 248	18 809
Transport and communication	JKRO	64 757	72 296	80 667	83 759	86 581	90 644	91 654	95 001	101 425	104 466
Other business services	JKRP	6 627	7 037	6 783	7 252	7 315	7 745	6 718	6 839	6 816	7 066
Public administration	JKRQ	10 814	10 787	10 389	9 664	9 006	9 680	9 724	8 977	9 232	9 226
Education, health and social work	JKRR	11 821	11 583	12 223	12 738	11 974	12 670	10 499	10 489	11 071	11 029
Other services	JKRS	58 089	52 242	46 924	40 640	38 379	34 823	31 693	28 724	27 326	27 159
Households	JKRT	141 774	141 856	151 633	155 007	155 461	158 921	157 939	158 470	160 663	155 972
Total greenhouse gas emissions	JKRU	**808 315**	**753 669**	**759 059**	**727 536**	**732 481**	**740 035**	**721 105**	**730 112**	**734 839**	**733 446**
of which, emissions from road transport[2]	JKRV	111 824	114 693	122 215	123 915	123 363	123 477	126 205	126 249	127 489	128 057
of which, emissions from water transport[3]	F8ZP	17 015	17 014	19 764	16 630	16 138	20 551	22 279	23 789	27 442	27 234
of which, emissions from air transport[4]	F8ZQ	20 374	24 658	28 045	33 845	37 350	36 825	36 122	37 361	40 382	42 843
Acid rain precursor emissions - SO2,NOx,NH3[5]											
Agriculture	JKRW	719	669	680	659	611	597	575	557	562	556
Mining and quarrying	JKRX	101	83	91	82	84	74	77	92	88	87
Manufacturing	JKRY	934	760	663	562	511	490	443	432	438	437
Electricity, gas and water supply	JKRZ	3 277	1 937	1 284	981	1 052	994	914	935	752	639
Construction	JKSA	71	67	65	62	60	58	55	53	51	50
Wholesale and retail trade	JKSB	99	84	76	72	68	61	60	57	58	54
Transport and communication	JKSC	793	778	855	740	716	835	872	911	1 017	1 004
Other business services	JKSD	38	33	27	24	22	21	17	17	14	14
Public administration	JKSE	79	67	63	52	48	48	44	36	41	40
Education, health and social work	JKSF	61	44	39	28	23	22	17	16	15	15
Other services	JKSG	77	68	59	50	48	50	46	46	44	44
Households	JKUK	700	564	530	461	411	377	346	321	302	271
Total acid rain precursor emissions	JKUL	**6 950**	**5 154**	**4 433**	**3 773**	**3 653**	**3 629**	**3 466**	**3 472**	**3 383**	**3 212**
of which, emissions from road transport	JKUM	997	844	774	685	619	566	524	483	452	415

1 Carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbon and sulphur hexafluoride expressed as thousand tonnes of carbon dioxide equivalent.
2 Includes emissions from all road transport sources (eg HGVs, LGVs, cars and motorcycles) across all industries
3 Emissions from water transport industry (Environmental Accounts code 69)
4 Emissions from air transport industry (Environmental Accounts code 70)
5 Sulphur dioxide, nitrogen oxides and ammonia expressed as thousand tonnes of sulphur dioxide equivalent.

Source: Netcen, ONS

Differences between National Accounts air emission measure and other published measures

There are a number of formats for the reporting and recording of atmospheric emissions data, including those used by Defra for reporting greenhouse gases under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, and for reporting air pollutant emissions to the United Nations Economic Commission for Europe (UNECE), which differ from the National Accounts consistent measure published by ONS.

Differences between the National Accounts measure and those used for reporting under the UNFCCC and the Kyoto Protocol, following the guidance of the Intergovernmental Panel on Climate Change (IPCC), are shown in Table 2.4.

The National Accounts measure puts emissions on an UK residents basis by including all emissions generated by UK households and businesses transport at home and abroad and excluding emissions generated by non-residents travel and transport in the UK. This allows for a more consistent comparison with key National Account indicators such as gross domestic product and gross value added. The National Accounts measure also includes emissions of CO2 from bio-mass.

Greenhouse gas emissions reported following IPCC guidance for UNFCCC and Kyoto Protocol purposes are reported on a territory basis. They therefore include emissions from within an individual country but exclude emissions from international transport. (Reporting of air pollutant emissions to the UNECE is also on a 'territorial' basis). 'Net' greenhouse gas emissions reported under the UNFCCC include the total of all emissions and then net off removals from changes in land use and forestry. More detailed emissions data on this basis are published by Defra.

The measure of greenhouse gas emissions used to monitor progress against the UK's Kyoto Protocol target of a 12.5 per cent reduction by the period 2008-2012 differs slightly from the UNFCCC net greenhouse gases total previously mentioned because it uses a narrower definition of land use change and forestry, and additionally includes emissions from a number of Overseas Territories. This measure is used in the UK's climate change sustainable development indicator published by Defra. Table 2.4 also shows the baseline used for this reduction target.

Last updated Jul 2007

2.4 Greenhouse gas emissions bridging table National Accounts measure to IPCC[1] measure

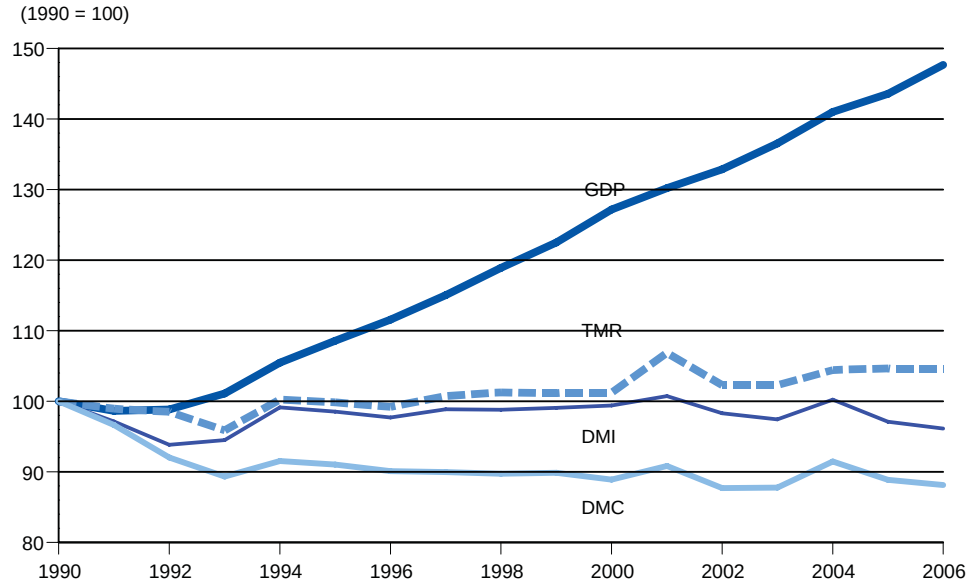
Thousand tonnes

		1990	1995	1997	1999	2000	2001	2002	2003	2004	2005
Greenhouse gases - CO2,CH4,N2O,HFC,PFCs and SF6[2]											
National Accounts measure	JKRU	808 315	753 669	759 059	727 536	732 481	740 035	721 105	730 112	734 839	733 446
less											
Bunker emissions[3]	A43J	22 569	27 100	31 215	34 276	36 318	36 249	34 613	35 112	39 374	41 261
CO2 from biomass[4]	A43K	2 980	5 240	5 762	6 411	6 573	7 261	7 507	8 352	9 358	9 207
Cross boundary adjustment[5]	A43L	12 958	12 882	16 217	16 494	17 392	21 284	23 848	25 705	27 450	27 349
plus											
Crown Dependancies[6]	EQ44	259	261	260	263	264	256	253	206	209	209
Landuse change / forestry[7]	A43M	2 895	1 002	514	–250	–426	–575	–1 101	–1 158	–1 913	–2 035
IPCC (inc. net Co2 emissions/removals)[8]	A43N	772 962	709 710	706 640	670 368	672 036	674 921	654 288	659 990	656 953	653 803
IPCC Kyoto greenhouse gas basket total[9]	F8ZL	770 254	708 699	705 668	669 838	671 581	674 528	654 230	659 794	657 333	654 127

Source: Netcen, ONS

1 Intergovernmental panel on climate change.
2 Carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbon and sulphur hexafluoride expressed as thousand tonnes of carbon dioxide equivalent.
3 IPCC memo item, emissions from international aviation and shipping bunkers.
4 Emissions arising from wood, straw, biogases and poultry litter combustion for energy production.
5 Emissions generated by UK households and businesses transport and travel abroad, net of emissions generated by non-residents travel and transport in the UK.
6 Emissions from deforestation, soils and changes in forest and other woody biomass.
7 Includes emissions of crown dependancies; Guernsey, Jersey, Isle of Man. The total used for assessing progress against the Kyoto Protocol target differs slightly from the sum of greenhouse gases reported above in the table due to differences in the coverage of land use change and forestry Cayman Islands, Falkland Islands and Montserrat.
8 Excludes emissions from overseas territories The UK's base year for the Kyoto target of a 12.5 per cent reduction by 2008-12 is the sum of 1990 emissions for Co2, CH4, and N2O and from 1995 emissions for HFC, PFC and SF6.
9 An allowance is included for net emissions from deforestation in 1990, in accordance with Article 3.7 of the Kyoto Protocol.

Material flows, 1990 to 2006



- *Direct Material Input (DMI) - used domestic extraction plus imports.*
- *Domestic Material Consumption (DMC) = DMI minus exports.*
- *Total Material Requirement (TMR) = DMI plus indirect flows associated with imports plus indirect flows from domestic extraction.*

Source: ONS

Changes in resource use are based on the movement of three indicators derived from the material flows account.

Direct Material Input (DMI) is the sum of the total amounts of primary resources extracted from the UK environment and the amount of imports into the UK.

The sum of materials taken from the UK environment for economic use, total domestic extraction (DE), has fallen for the seventh successive year from 583 million tonnes in 2005 to 562 million tonnes in 2006, a fall of 3.6 per cent. Since 1990 the mass of DE has fallen by 19.9 per cent and at 562 million tonnes, DE is at its the lowest recorded since 1970. These falls reflect lower levels of mineral and fossil fuel extraction.

Extraction of biomass, including items such as crops, fell 2.0 per cent between 2005 and 2006 as a result of less extraction associated with the agricultural harvest. The extraction of minerals fell slightly year on year by 0.3 per cent to 289 million tonnes driven by less extraction of sand and gravel. However, since 1990 the level of mineral extraction has fallen by 22.5 per cent reflecting reduced volume of crushed stone extraction. This may be in reaction to the introduction of the aggregates levy in 2002. Between 2005 and 2006, the extraction of fossil fuels fell by 9.3 per cent to 175 million tonnes, largely as result of lower volumes of crude oil and natural gas extraction.

In 2006, the mass of imports was 292 million tonnes, this is the fourth consecutive year that volumes of imports have been at historically high levels. Imports were 4.3 per cent higher than in 2005 and 56.2 per cent above 1990 levels. This is largely a result of sustained increases in the mass of fossil fuels imported. These were 148 million tonnes in 2006, 8.0 per cent higher than 2005 and 66.3 per cent above their 1990 level. The mass of imports associated with biomass, minerals and other products such as manufactured goods has increased slightly in the most recent year, from 143 million tonnes in 2005 to 144 million tonnes in 2006, as a result of a small increase in the mass of minerals imported.

Domestic Material Consumption (DMC) is Domestic Material Input (DMI) less the mass of goods exported from the UK. The Government has adopted DMC as an indicator of material use in Sustainable Consumption and Production indicators and the Sustainable Development Strategy.

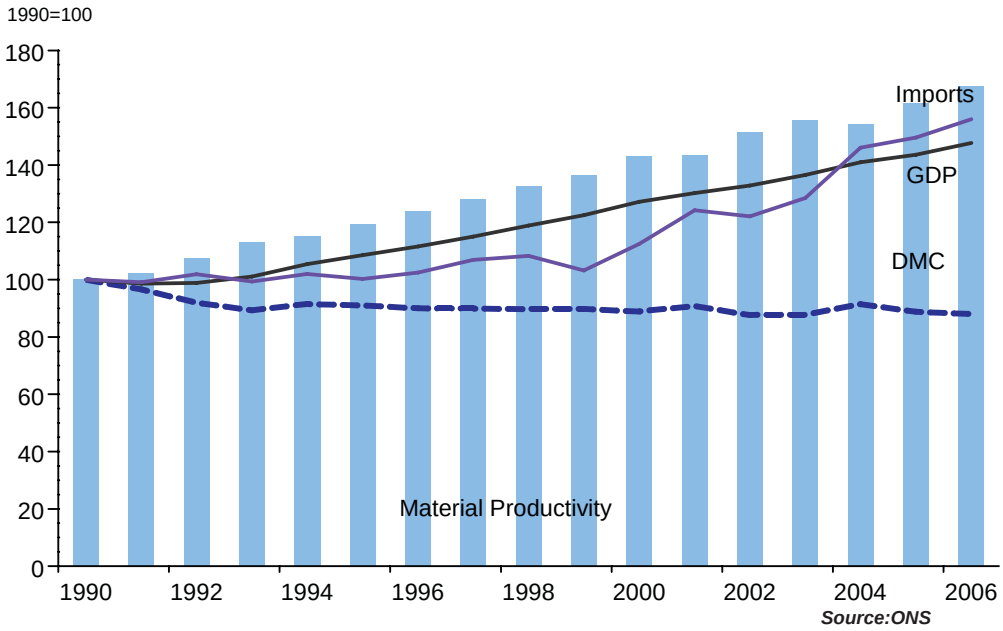
Year on year DMC has decreased 0.9 per cent from 686 million tonnes in 2005 to 680 million tonnes in 2006. This fall is mainly driven by lower levels of DE that have not been totally offset by the increased mass of imports. In addition, the mass of exports fell, as it has done every year since 2003, from 177 million tonnes in 2005 to 174 million tonnes in 2006. This fall is caused by a 5.7 per cent drop in the volume of fossil fuels exported, reflecting fewer crude oil and natural gas exports.

Total Material Requirement (TMR) is DMI plus the excess material or hidden flows associated with the extraction of materials from the UK environment plus the indirect flows associated with the extraction of raw materials and semi-natural products imported into the UK. Indirect flows account for by far the greater proportion of TMR compared with DMI.

Between 2005 and 2006, TMR is unchanged at 2134 million tonnes. While the hidden flows associated with extraction of materials in the UK have been falling in recent years as a result of lower DE, imports are helping to sustain the overall level of TMR. TMR is currently at its highest level since 2001, largely as a result of the greater mass of fossil fuel imports and their associated indirect flows, these have risen 5.3 per cent between 2005 and 2006 and 73.3 per cent since 1990.

Other analyses

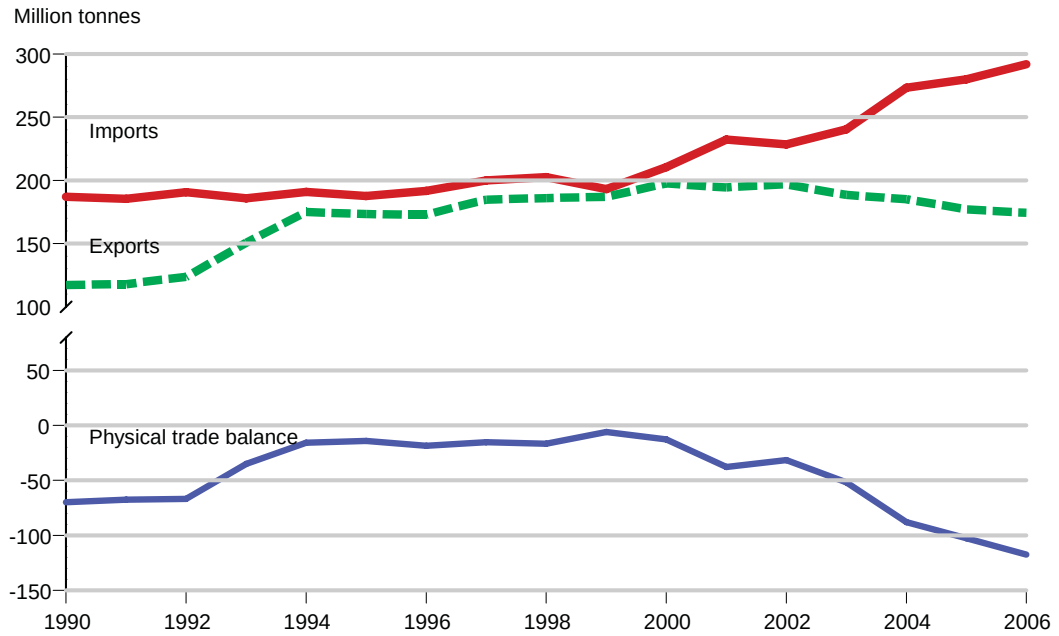
Material productivity, 1990 to 2006



The concept of material productivity is used to assess progress towards sustainable development. It is presented in terms of the relationship between material use and economic activity. This is calculated by dividing Gross Domestic Product in real terms by Domestic Material Consumption (DMC) that is the mass of domestic extraction plus the mass of imports and less the mass of exports. The chart above shows that material productivity has increased between 1990 and 2006. This trend indicates that material use is falling in relation to the level of economic activity in the United Kingdom and supports evidence that domestic material use and economic growth have decoupled since 1990. However, levels of imports have generally risen over the same period suggesting that some of the environmental impacts associated with consumption are being transferred abroad.

The Physical Trade Balance (PTB) demonstrates the impact of imports and exports in the material flows. In line with balance of payments methodology, the PTB is calculated by subtracting the mass of imports from the mass of exports. The chart below shows that the UK has a negative PTB in all years since 1990 indicating that the mass of imports exceeds the mass of exports. Indeed, since 1970, the only time the UK has shown a positive PTB, when exports are greater than imports, was in 1983 and even then the difference was only 2 million tonnes. In recent years the gap between imports and exports has widened due to the falling mass of fossil fuel exports and rising mass of fossil fuels imports, leading to an increase in the PTB. Currently the PTB shows the largest negative value since 1976.

Physical trade balance, 1990 to 2006



Source: ONS / HM Revenue and Customs

Last updated December 2007.

2.5 Material Flows

Million tonnes

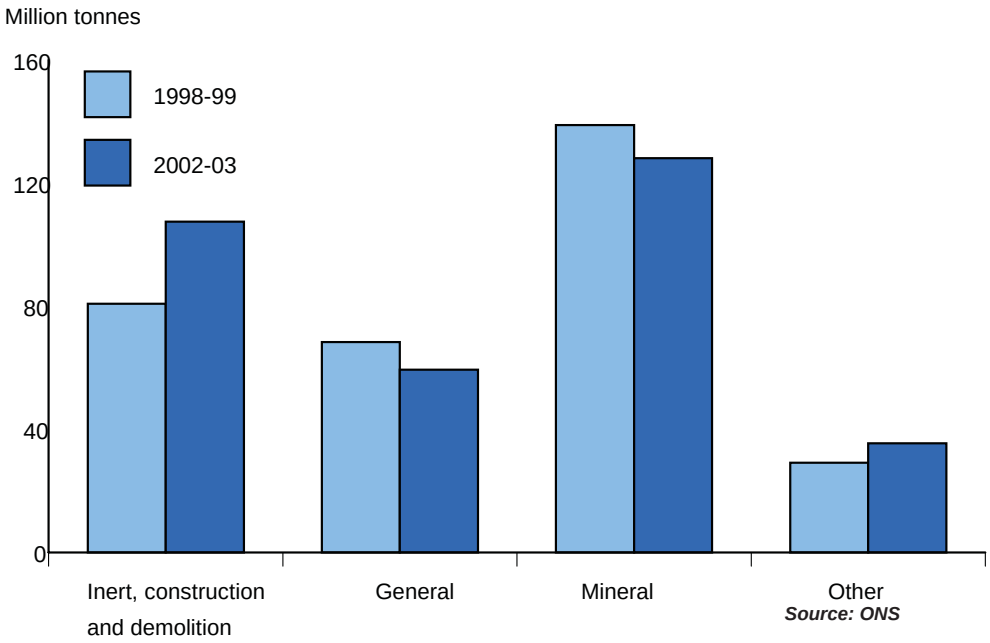
		1970	1975	1980	1985	1990	1995	1998	1999	2000	2001	2002	2003	2004	2005	2006
Domestic extraction																
Biomass																
Agricultural harvest	JKUN	42	38	47	47	46	47	51	52	51	45	51	48	48	47	45
Timber	JKUO	3	3	4	5	6	8	7	7	8	8	8	8	8	9	8
Animal grazing	JKUP	49	49	49	48	47	45	44	43	43	43	43	43	43	43	43
Fish	JKUQ	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total biomass	JKUR	96	92	101	100	101	100	103	104	102	97	102	100	101	100	98
Minerals																
Ores	JKUS	12	5	1	1	–	–	–	–	–	–	–	–	–	–	–
Clay	JKUT	38	33	25	23	21	18	16	15	15	14	14	14	15	14	13
Other industrial minerals	JKUU	14	11	11	11	11	10	8	8	8	9	8	9	8	8	8
Sand and gravel	JKUV	122	131	110	112	128	106	103	105	106	105	98	95	102	99	97
Crushed stone	JKUW	156	169	150	160	212	200	181	179	176	183	173	170	175	169	171
Total minerals	JKUX	342	349	298	307	373	334	309	308	305	311	293	288	300	290	289
Fossil fuels																
Coal	JKUY	149	129	130	94	94	53	41	37	31	32	30	28	25	20	19
Natural gas	JKUZ	11	37	39	37	43	71	90	102	109	106	104	103	96	88	80
Crude oil	JKVA	–	2	80	128	92	130	132	137	126	117	116	106	95	85	77
Total fossil fuels	JKVB	161	168	249	259	229	254	264	276	266	255	250	237	217	193	175
Total domestic extraction	JKVC	**598**	**608**	**648**	**666**	**702**	**688**	**676**	**687**	**673**	**663**	**645**	**626**	**618**	**583**	**562**
Imports																
Biomass	JKVD	38	33	30	31	38	40	42	42	42	46	47	49	50	50	50
Minerals	JKVE	30	32	24	34	41	50	54	50	51	54	55	55	60	58	59
Fossil fuels	JKVF	123	111	74	76	89	73	76	71	83	99	95	102	127	137	148
Other products	JKVG	6	7	14	15	19	23	31	30	34	34	32	34	36	35	35
Total imports	JKVH	**197**	**184**	**141**	**157**	**187**	**188**	**203**	**193**	**210**	**232**	**228**	**240**	**273**	**280**	**292**
Exports																
Biomass	JKVI	3	5	8	11	13	15	17	16	17	13	15	19	18	19	20
Minerals	JKVJ	17	20	26	22	25	39	46	42	44	43	42	44	48	48	50
Fossil fuels	JKVK	23	19	60	102	67	103	103	108	115	118	120	104	98	88	83
Other products	JKVL	5	7	8	11	12	17	20	21	21	21	20	21	21	21	21
Total exports	JKVM	**47**	**51**	**101**	**146**	**117**	**173**	**186**	**187**	**198**	**194**	**197**	**189**	**185**	**177**	**174**
Domestic Material Consumption (domestic extraction + imports - exports)	JKVU	**748**	**741**	**688**	**677**	**772**	**703**	**693**	**694**	**686**	**701**	**677**	**677**	**706**	**686**	**680**
of which																
Biomass	G9A8	131	119	123	120	125	126	128	129	127	130	134	130	133	131	128
Minerals	G9A9	355	361	296	319	389	346	318	316	312	322	307	298	312	300	298
Fossil fuels	G9AA	261	260	263	233	250	224	237	239	234	236	225	236	246	241	240
Indirect flows																
From domestic extraction (excl soil erosion)[1]	JKVN	576	575	633	627	693	634	589	620	567	572	564	549	547	519	487
Of which;																
Unused biomass	JKVO	25	23	32	35	37	37	40	40	40	35	40	38	38	37	36
Fossil fuels	JKVP	169	202	287	274	309	276	245	260	231	241	225	209	204	178	149
Minerals and ores	JKVQ	185	155	120	120	144	116	103	98	97	95	101	100	104	101	99
Soil excavation and dredging	JKVR	197	195	195	199	203	204	201	222	199	202	199	202	201	203	203
From production of raw materials and semi-natural products imported	JKVS	394	395	368	423	457	527	597	562	614	711	648	671	692	752	792
Other indicators																
Physical trade balance (exports - imports)[3]	DZ76	–150	–133	–40	–11	–70	–14	–17	–6	–13	–38	–32	–52	–88	–103	–117
Direct Material Input (domestic extraction + imports)	JKVT	796	792	789	822	889	876	879	881	884	896	874	866	891	863	855
Total Material Requirement (direct material input + indirect flows)	JKVV	1 765	1 762	1 790	1 872	2 039	2 036	2 065	2 063	2 064	2 179	2 086	2 086	2 130	2 134	2 134

1 Indirect flows from domestic extraction relate to unused material which is moved during extraction, such as overburden from mining and quarrying.
2 Components may not sum to totals due to rounding.
3 A negative physical trade balance indicates a net import of material into the UK.

Source: ONS

General waste

Waste arisings in the UK, by type 1998/99 and 2002/03



Source: ONS

The United Kingdom generated an estimated 330.4 million tonnes of waste in 2002/03. Mineral waste amounted to 128.1 million tonnes while inert, construction and demolition waste accounted for a further 107.5 million tonnes. Mineral and construction and demolition waste accounted for 71 per cent of all UK waste.

The main sources of waste are the construction industry, the mining and quarrying industries and UK households, which generated 122.1 million tonnes, 95.9 million tonnes and 30.9 million tonnes respectively. Waste from those three sources accounted for 75 per cent of all UK waste generated in 2002/03.

Previously published estimates for 1998/99 have been revised to take on new data and a reclassification of certain types of agricultural waste, resulting in a revised total arising of 317.3 million tonnes. Waste arisings in 2002/03 are 13.1 million tonnes (4 per cent) higher than in 1998/99 primarily due to higher levels of construction and demolition waste. Construction and demolition waste rose 21.8 million tonnes reflecting the increase in construction activity during the period. This rise was partly offset by a 5.2 million tonne fall in mining and quarrying waste.

The latest figures for waste arisings are derived from a variety of sources with one of the main source being the 2002/03 Environment Agency industrial and commercial waste survey of England. Other sources included the Office for the Deputy Prime Minister's survey of construction and demolition waste and the Department for Environment, Food and Rural Affairs' (Defra) e-Digest of waste statistics. Where UK data are not available, estimates for the devolved administrations are used and grossed to a UK total using data for gross value added for the appropriate industry or sector.

The type of waste produced, how it is managed and how it is transported have impacts on the environment. Waste is a potential resource and increased levels of re-use, recycling and energy recovery will contribute to sustainable development. The Quarry Products Association estimate that recycled or secondary aggregates account for approximately 25 per cent of the total aggregates market while Defra estimate that around 15 per cent of all household waste went for recycling or composting in 2002/03.

Last updated November 2005.

2.6 Total waste arisings in the United Kingdom 2002/03

Million tonnes

	Inert, construction demolition	Paper, card	Animal & vegetable	General	Metal & scrap equipment	Mineral	Other waste	Total
Agriculture[1]	–	–	–	0.4	–	–	–	0.4
Mining and quarrying[2]	–	–	–	–	–	95.9	–	95.9
Food, drink and tobacco[3]	–	0.3	4.9	2.2	0.1	0.8	0.3	8.6
Textiles and clothing[3]	–	–	–	0.8	–	–	0.6	1.5
Pulp, paper, printing and publishing[3]	–	2.3	–	1.9	0.1	0.1	0.4	4.7
Chemicals[3]	0.1	0.2	–	1.4	0.1	0.1	4.3	6.2
Non-metallic mineral products[3]	0.8	–	–	0.3	0.2	1.3	–	2.7
Metal products[3]	0.1	0.1	–	0.6	1.4	4.9	0.5	7.5
Machinery and equipment[3]	–	0.2	–	0.7	0.4	0.3	0.2	1.7
Transport equipment	–	0.1	–	0.5	0.9	0.2	0.1	1.7
Other manufacturing [3]	–	0.1	–	2.3	0.1	–	–	2.5
Electricity, gas and water supply[4]	–	–	–	0.3	0.1	7.1	0.3	7.8
Construction[5,10]	105.6	–	–	–	–	16.6	–	122.1
Wholesale and retail[6]	0.1	4.2	1.9	7.3	0.6	–	0.4	14.7
Hotels and catering[6]	–	0.2	0.2	3.5	–	–	0.1	4.0
Transport and communications[6,7]	–	0.4	0.1	1.4	0.1	–	0.4	2.5
Finance and other services[6]	0.5	1.3	0.1	5.3	0.2	0.2	0.5	8.0
Public administration, health and education[6]	0.2	0.8	0.2	3.7	0.1	–	0.9	5.9
Waste water services[8]	–	–	1.1	–	–	–	–	1.1
Households[9]	–	1.5	1.6	26.6	0.6	0.6	–	30.9
Total waste arisings	107.5	11.5	10.1	59.4	4.9	128.1	9.0	330.4

By convention a dash indicates zero, however minimal waste is undoubtedly generated by these sectors

1 Agricultural waste estimates are based on Defra data for England and grossed to a UK total using agriculture GVA for 2002
2 Estimated from calendar year data published by Defra in e-digest
3 Industry figures based on Environment Agency estimates for 2002/03 for England and grossed to UK total on the basis of estimated manufacturing industry GVA for 2002 (source ONS)
4 Includes manufacture of coke and petroleum products. Figures based on Environment Agency estimates for 2002/03 for England and grossed to UK total on basis of electricity, gas and water industry GVA for 2002 (source ONS)
5 Provisional figure based on ODPM survey for 2003 for England and grossed to UK total using 2002 share of construction industry GVA (source ONS)
6 Services sector figs based on Environment Agency estimates for 2002/03 for England and grossed to the UK total on the basis of service sector GVA exclude those for the vehicle repair and maintainance sector
7 Mineral waste estimate is for the amount of dredged material, based on Defra estimates for 2002/03 for all UK waters
8 Dry weight arisings for 2002/03 (source Water UK). Wet weight can be estimated on the basis of 4 per cent solid content on average, giving a total of 26.5 million tonnes
9 Total household municipal waste 2002/03 as published by Defra in e-Digest. Estimates for paper and card, composting (vegetable waste), glass (mineral waste), residential household bin collection and scrap are based on estimated amounts recycled through integrated and separate kerbside collection schemes and from civic amenity and bring sites.
10 Construction industry waste includes an estimate of dredged materials.

Source: see Notes 1 - 9

Radioactive waste

Data in table 2.7A [1] show that in 2004 total stocks of high level radioactive waste increased by 11.8 per cent to 1,890 cubic metres compared with 1991 levels. Over the same period stocks of intermediate level waste rose 59.9 per cent from 51,560 cubic metres to 82,450 cubic metres.

Stocks of radioactive waste are predominantly the result of the operation of the nuclear power stations, with much smaller proportions sourced to medical or defence activity.

The volume of low level waste disposal has increased in recent years, from 6,100 cubic metres in 2001 to 11,400 in 2004 following a period of reductions in the 1990s caused by changing methods of storage. The current volume of low level disposals is less than half that in 1991. Stocks of low level waste have more than tripled since 1991 from 6,250 to 20,850 cubic metres. This is partly due to the filling of the Dounreay LLW repository and the current necessity to store waste at that site.

Solid radioactive wastes higher than LLW are not discharged into the environment but stored and conditioned by processes such as cementation and vitrification (turning into glass).

Shown in table 2.7b, estimated total current and future radioactive waste arisings are largely attributable to low level waste. In 2004, low level waste accounted for 89.4 per cent of current total and anticipated future radioactive waste arisings, while intermediate level waste amounted to 10.6 per cent and high level waste amounted to 0.06 per cent of total and future radioactive waste arisings.

The presentation of this data has changed since previous editions of *Environmental Accounts* because data for "when conditioned" in the 2004 Radioactive Waste Inventory is not presented consistently compared with earlier data.

Last updated November 2006

1. Based on information downloaded 9.10.2006 from Defra web site http://www.defra.gov.uk/environment/statistics/radioact/radstocks.htm

2.7A Stocks and disposals of solid radioactive waste by source[1] Great Britain

Cubic metres

		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Stock of high level waste[2]															
From reprocessing of spent nuclear fuel as stored[3]	JPOF	1 690	..	..	1 640	..	..	..	1 810	..	..	1 970	..	..	1 890
Stock of intermediate level waste[4]															
As stored															
Nuclear fuels	JPOH	49 230	..	..	58 470	..	..	..	67 270	..	..	70 960	..	..	77 790
Medical	JPOI	380	..	..	290	..	..	..	290	..	..	360	..	..	450
Defence	JPOJ	1 950	..	..	2 750	..	..	..	3 390	..	..	4 090	..	..	4 210
Total	JPOK	51 560	..	..	61 510	..	..	..	70 950	..	..	75 410	..	..	82 450
Disposals of low level waste[5,6]															
Nuclear fuels	JPOP	22 502	23 323	20 787	–	–	–	–	–	..	..	..	..	..	..
Medicinal	JPOQ	1 055	278	545	–	–	–	–	–	..	..	..	..	..	..
Defence	JPOR	1 543	1 799	1 868	–	–	–	–	–	..	..	..	..	..	..
Total disposals of low level waste	JPOS	25 100	25 400	23 200	26 300	12 700	10 300	9 200	12 600	8 000	8 400	6 100	10 800	11 400	..
Stock of low level waste															
Nuclear fuels	JPOT	4 990	..	..	5 800	..	..	..	6 300	..	..	12 930	..	..	18 600
Medicinal	JPOU	60	..	..	10	..	..	..	–	..	..	–	..	..	50
Defence	JPRA	1 200	..	..	2 080	..	..	..	1 700	..	..	1 650	..	..	2 200
Total stock of low level waste	JPRB	6 250	..	..	7 890	..	..	..	8 000	..	..	14 580	..	..	20 850

1 Figures for stocks of waste only available from inventories for 1991, 1994, 1998, 2001 and 2004

2 High level wastes (HLW) come from the reprocessing of irradiated nuclear fuel and are intensely radioactive. They contain over 90 per cent of all the radioactivity in wastes from the nuclear cycle. HLWs are of relatively small volume, but have a high heat output as a result of the energy from radioactive decay.

3 "As stored" is the form in which the waste is currently stored, except for low level waste, which is the estimated volume after supercompaction.

4 Intermediate level wastes (ILW) have a lower radioactivity and heat output than high level waste, but a radioactivity content which exceeds the upper limits for low level waste. Examples of ILW include the irradiated metal cladding for nuclear reactor fuel, reactor components and chemical process residues and filters.

5 Up to and including 1993 figures are net waste volumes, from 1994 they are packaged waste volumes. Supercompaction was introduced in 1995 for all wastes sent to the waste repository at Drigg. This has significantly reduced volumes of disposals. The breakdown by source is not available after 1993.

6 Low level wastes (LLW) include concrete, rubble and soil from building against radiation emissions during handling and transport.

Source: Poyry

2.7B Estimated total current and future radioactive waste arisings[1] Great Britain

Cubic metres

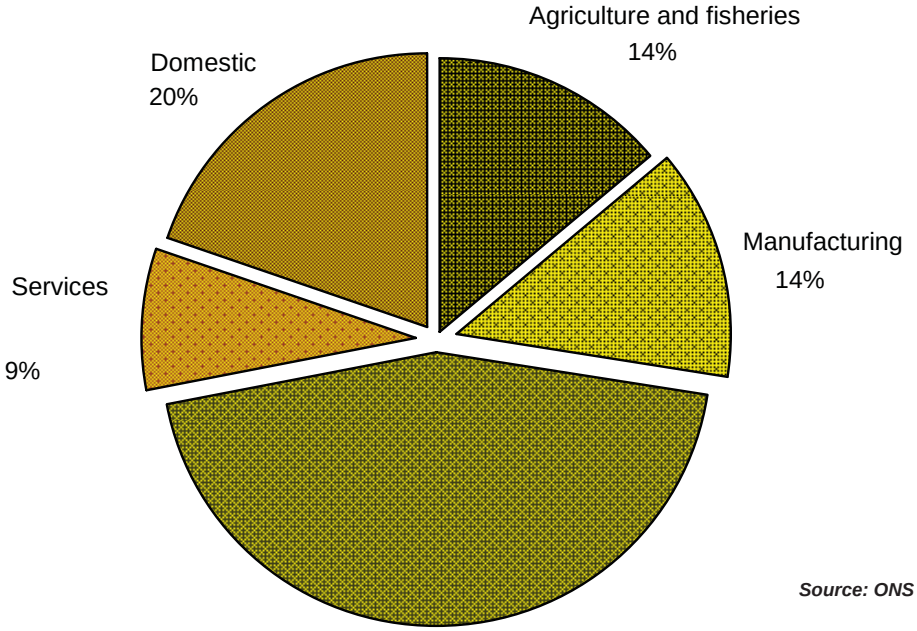
		2004
Future stocks in conditioned state[2]		
High level waste[3]		
Sellafield	G8IA	1 340
Intermediate level waste[4]		
Sellafield	G8IC	123 920
Dounreay	G8ID	11 880
Other BNFL[5]	G8IE	7 410
Other UKAEA[6]	G8IF	8 870
Power Stations[7]	G8IG	77 170
GE Healthcare	G8IH	790
URENCO	G8II	..
MOD	G8IJ	10 970
Total intermediate level waste	G94Q	241 010
Low level waste[8]		
Sellafield	G8IK	833 880
Dounreay	G8IL	137 130
Other BNFL	G8IM	123 650
Other UKAEA	G8IN	102 970
Power stations	G8IO	432 940
GE Healthcare	G8IP	17 090
URENCO	G8IQ	270
MOD	G8IR	388 030
Total low level waste	G94R	2 035 960
Total future stocks in conditioned state	G94S	2 278 310

1 Includes current stocks and wastes forecast to arise in the future, based on assumptions. See "The 2004 UK Radioactive Waste Inventory".
2 Conditioned waste is the form suitable for long term storage (ie vitrified) Volume indicates predicted final conditioned volume. Volumes rounded to the nearest 10 cubic metres.
3 High level wastes (HLW) come from the reprocessing of irradiated nuclear fuel and are intensely radioactive. They contain over 90 per cent of all radioactivity in wastes from the nuclear cycle. HLWs are of relatively small volume, but have a high heat output as a result of the energy from radioactive decay.
4 Intermediate level wastes (ILW) have a lower radioactivity and heat output than HLW but a radioactivity content that exceeds the upper limits for low level wastes. Examples of ILW include irradiated metal cladding for nuclear reactor fuel, reactor components, and chemical process residues & filters
5 Other BNFL includes Calder Hall, Chapelcross, Capenhurst and Springfields.
6 Includes wastes from minor producers, largely stored at Harwell.
7 Includes all BNFL Magnox stations (except Calder Hall and Chapelcross),
8 Low level wastes (LLW) include concrete, rubble and soil from building demolition, discarded protective clothing and worn out or damaged plant and equipment. Unlike HLW and ILW, LLW does not normally require shielding against radiation emissions during handling and transport.

Source: Poyry

Water

UK water resource use by industry, 1997/98



Source: ONS

In 1997/98, nearly 17 billion cubic metres of water were taken from groundwater and non-tidal waters in the UK. Of this total about 20 per cent, 3.2 billion cubic metres, was used by households through the public water supply network. A further 1.8 billion cubic metres were lost through leakage. Electricity generation and fisheries account for the bulk of the use of water removed directly by industries.

These estimates are taken from the UK water accounts for 1997/98, which show that water is an important resource for all aspects of the UK economy. The accounts cover the use of groundwater and non-tidal water only.

Most of the water consumed by agriculture and industry comes directly from rivers and lakes, although a significant amount of the water provided through the public water supply network (PWS) is also used by various industries, such as the food and drinks sector and the chemicals industry. The water accounts exclude use of tidal waters, whether freshwater or not and the uses of water (such as for hydro-electric power) that do not result in it changing. However the accounts do include some uses where the water is returned to the same part of the environment in an unchanged state, such as where the water has been used for cooling purposes only.

The estimates for the water accounts are mainly based on research carried out by the Environment Agency on water consumption in England and Wales. For the use of the Public Water Supply (PWS) in 1997/98, the Agency asked the water companies to provide estimates of use by industrial sectors. Information on direct removals of groundwater and non-tidal waters by sector in 1997/98 was obtained from the Environment Agency's National Abstraction Licensing Database, using a combination of information on the purpose of the abstractions and estimates of the ratio of actual use to licensed use.

Last updated 2002.

2.8 Consumption of water resources by industrial sector 1997/8

Million cubic metres

	Public water supply	Direct abstractions from groundwater and non-tidal waters	Total groundwater and non-tidal abstractions
Use of groundwater and non-tidal water by:			
Agriculture	10	360	370
Fisheries	–	2 060	2 060
Mining and extraction[1]	10	60	70
Food, drink and tobacco	190	110	300
Textiles	10	80	90
Pulp, paper, printing and publishing	20	190	210
Fuel processing	–	–	–
Chemicals	240	430	670
Rubbers and plastics	–	10	10
Mineral products	10	70	80
Metal manufacturing and products	90	240	330
Manufacture and machinery	100	10	110
Electrical equipment	30	–	30
Transport equipment	30	–	30
Other manufacturing including recycling	150	10	160
Unspecified industry[2]	120	160	280
Electricity and gas production	50	5 560	5 610
Water supply[3]	1 750	–	1 750
Construction	10	10	20
Wholesale, hotels and catering	140	–	140
Education and health	190	–	190
Other services	310	–	310
Domestic	3 180	70	3 250
Other abstractions[4]	–	160	160
Statistical discrepancies	600	–	600
Total use of groundwater and non-tidal waters	**7 240**	**9 590**	**16 830**

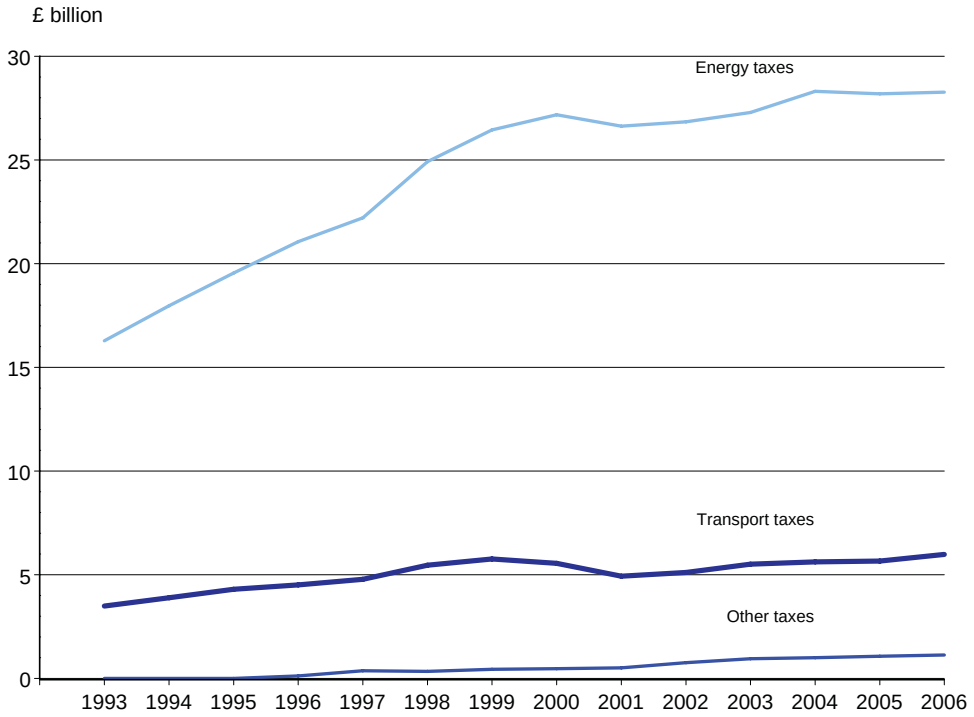
1 Excludes mineral washing
2 Includes mineral washing
3 Includes leakage
4 Includes some private domestic water supply, public water supply licences and frost protection use.

Source: Environment agency, Scottish executive, ONS

Monetary accounts

Environmental taxes

Environmental tax revenue as a percentage of GDP 1993 to 2006



Government revenue from environmental taxes in 2006 was £35.4 billion. Environmental taxes, as a percentage of Gross Domestic Product (GDP), followed a trend of small increases between 1993 and 1999. However, since 1999 this trend has reversed. In 2006, the proportion fell to 2.7 per cent of GDP compared with 3.6 per cent in 1999. Similarly, environmental taxes as a percentage of total taxes and social contributions increased to a maximum of 9.7 per cent in 1999, but in recent years have fallen. Latest data show that in 2006, they have fallen to 7.3 per cent from 7.7 per cent a year earlier. These falls are a result of growth in the economy and in total taxes and social contributions exceeding that of environmental taxes.

The range of environmental tax revenues has changed significantly in recent years due, in part, to changes in the types of fuel available: leaded petrol has been withdrawn from sale and Ultra Low Sulphur Petrol and Diesel (ULSP/D) have been introduced. Following the October 2000 Budget, these fuels attracted lower rates of duty than regular unleaded petrol and diesel due to their reduced particulate emissions and producers have now switched production to low sulphur varieties. Duty on hydrocarbon oils such as petrol and diesel accounted for 66.3 per cent of total environmental taxes in 2006. This is a share that has remained broadly unchanged since 2000. As a percentage of total energy taxes hydrocarbon revenues increased from 82.8 per cent to 83.0 per cent between 2005 and 2006 and since 1993 their share has increased from 76.8 per cent.

Revenue from the Landfill tax rose by 9.7 per cent between 2005 and 2006 as a result of the policy to increase the tax rate each year. In 2006, revenue from Vehicle Excise Duty has increased by 5.2 per cent to £5.0 billion.

Revenues from the Aggregates Levy have been relatively unchanged since 2003, amounting to £0.3 billion in 2006. Revenues from Air Passenger Duty are 7.4 per cent higher than a year earlier standing at a record high of almost £1.0 billion.

ONS recently conducted a review of environmental taxes (Gazley, I. ,Economic Trends, October 2006). However, it has not been possible to introduce the recommendations of this review for this publication due to unresolved data availability issues.

Last updated November 2007

3.1 Government revenues from environmental taxes

£ million

		1993	1995	1998	1999	2000	2001	2002	2003	2004	2005	2006
Energy												
Duty on hydrocarbon oils	GTAP	12 497	15 360	20 996	22 391	23 041	22 046	22 070	22 476	23 412	23 346	23 448
including												
Unleaded petrol[1]	GBHE	4 242	5 901	9 897	11 952	11 573	1 938	–	–	–	–	–
Leaded petrol/LRP[2]	GBHL	4 502	4 088	2 984	1 630	1 115	661	310	320	75	20	15
Ultra low sulphur petrol	ZXTK	–	–	–	–	976	10 285	12 453	11 891	12 171	11 723	11 354
Diesel[3]	GBHH	3 484	5 127	7 088	1 274	23	66	–	–	–	–	–
Ultra low sulphur diesel	GBHI	–	–	806	7 338	9 086	8 633	9 137	9 579	10 298	10 808	10 811
VAT on duty	CMYA	2 187	2 688	3 674	3 918	4 032	3 858	3 862	3 933	4 097	4 086	4 103
Fossil fuel levy	CIQY	1 331	1 306	181	104	56	86	32	–	–	–	–
Gas levy	GTAZ	240	161	32	–	–	–	–	–	–	–	–
Climate change levy	LSNT	–	–	–	–	–	585	825	828	756	747	711
Hydro-benefit	LITN	22	27	32	35	42	46	44	44	40	10	–
Road vehicles												
Vehicle excise duty	CMXZ	3 482	3 954	4 631	4 873	4 606	4 102	4 294	4 720	4 763	4 762	5 010
Other environmental taxes												
Air passenger duty	CWAA	–	339	823	884	940	824	814	781	856	896	961
Landfill tax	BKOF	–	–	333	430	461	502	541	607	672	733	804
Aggregates levy	MDUQ	–	–	–	–	–	–	213	340	328	327	321
Total environmental taxes	JKVW	**19 755**	**23 835**	**30 702**	**32 635**	**33 178**	**32 049**	**32 695**	**33 729**	**34 924**	**34 907**	**35 358**
Environmental taxes as a % of:												
Total taxes and social contributions	JKVX	9.0	9.3	9.7	9.7	9.3	8.6	8.7	8.5	8.3	7.7	7.3
Gross domestic product	JKVY	3.1	3.3	3.5	3.6	3.5	3.2	3.1	3.0	2.9	2.8	2.7

1 Unleaded petrol includes superunleaded petrol.
2 Lead Replacement Petrol (the alternative to 4-Star leaded petrol introduced in 2000) is lead-free.
3 Duty incentives have concentrated production on ultra low sulphur varieties.

Source: ONS, Department for Business Enterprise & Regulatory Reform

Environmental taxes by 13 industries

This 13 industry analysis of environmental taxes covers the main manufacturing and services industries as well as the household sector and the rest of the world.

Environmental taxes are divided into four main catergories; energy, transport, pollution and resources. In 2004, UK households contributed the most towards environmental tax revenue, paying just over half of all environmental taxes. This amounted to £18.6 billion or 53.1 per cent. The next highest source, the transport and communication industries, paid £6.2 billion or 17.6 per cent of all environmental tax revenues. Other significant contributors are manufacturing (7.4 per cent) and the wholesale and retail trade (7.0 per cent).

A time series of environmental taxes by 13 industries between 1993 and 2004 is now available. This shows that since 1993 environment taxes have been levied on an increasing variety of items. In 1993, these fell into two environmental tax categories, energy and transport. By 2004, further taxes had been introduced in both the pollution and resources categories.

However, the percentage contributions of the respective sectors remains similiar throughout the period. In 1993, UK households paid 55.3 per cent of revenues a figure slightly higher than in 2004. The transport and communications industries paid 14.5 per cent of environmental tax revenues, less than in the most recent year for which data is available. The wholesale and retail industries and the manufacturing industries paid 8.3 per cent and 6.6 per cent respectively in 1993.

Last updated November 2006

3.2A Environmental taxes breakdown by 13 Industries 2004

£ million

	Energy	Transport	Pollution	Resources	Total
Agriculture	95	64	1	–	160
Mining and quarrying	78	4	2	326	410
Manufacturing	2 439	82	71	–	2 592
Energy, gas and water supply	178	5	5	–	188
Construction	1 329	110	7	2	1 448
Wholesale and retail trade	2 151	232	54	–	2 437
Transport and communication	5 977	152	28	–	6 157
Other business services	820	187	60	–	1 068
Public administration	237	2	109	–	348
Education, health and social work	164	7	82	–	253
Other services	422	41	253	–	717
Households	14 065	4 490	–	–	18 555
Rest of the world	349	243	–	–	592
Total	28 305	5 619	673	328	34 924

Components may not sum to totals due to rounding

Source: ONS, Environmental Accounts

3.2B Environmental taxes breakdown by 13 Industries 2003

£ million

	Energy	Transport	Pollution	Resources	Total
Agriculture	54	65	2	–	122
Mining and quarrying	79	5	2	338	423
Manufacturing	1 998	97	71	–	2 166
Energy, gas and water supply	197	3	4	–	204
Construction	1 371	86	5	2	1 464
Wholesale and retail trade	2 080	225	46	–	2 351
Transport and communication	6 351	142	24	–	6 518
Other business services	886	208	50	–	1 144
Public administration	245	2	97	–	344
Education, health and social work	174	5	70	–	249
Other services	457	32	237	–	726
Households	13 192	4 418	–	–	17 610
Rest of the world	198	213	–	–	410
Total	27 281	5 501	607	340	33 729

Components may not sum to totals due to rounding

Source: ONS, Environmental Accounts

3.2C Environmental taxes breakdown by 13 Industries 1993

£ million

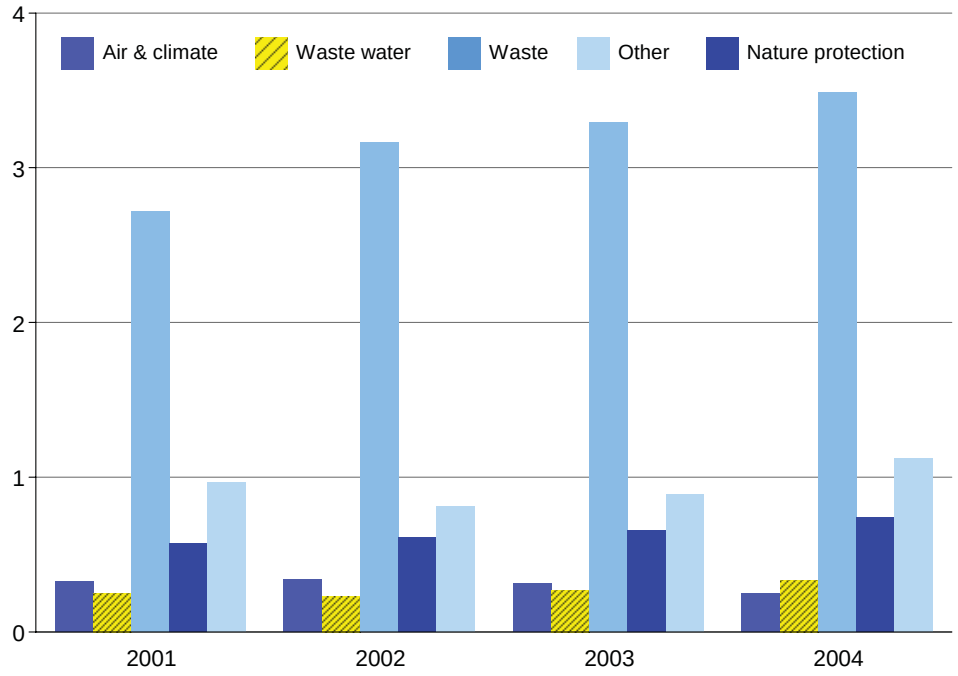
	Energy	Transport	Pollution	Resources	Total
Agriculture	75	42	–	–	117
Mining and quarrying	59	7	–	–	66
Manufacturing	1 224	84	–	–	1 308
Energy, gas and water supply	627	11	–	–	638
Construction	523	81	–	–	604
Wholesale and retail trade	1 174	464	–	–	1 638
Transport and communication	2 662	204	–	–	2 866
Other business services	588	231	–	–	819
Public administration	194	3	–	–	197
Education, health and social work	124	29	–	–	153
Other services	305	25	–	–	330
Households	8 620	2 301	–	–	10 921
Rest of the world	98	–	–	–	98
Total	16 273	3 482	–	–	19 755

Components may not sum to totals due to rounding

Source: ONS, Environmental Accounts

Environmental protection expenditure by public sector, 2001 - 2004

£ billion



Source: ONS

Tables 3.3 and 3.4 show that in 2004, public sector environmental protection expenditure was estimated to be £5.9 billion, representing 0.5 per cent of GDP. This is a rise of 9.3 per cent compared with 2003 when the level of spending stood at £5.4 billion. Expenditure on waste management amounted to £3.5 billion, mostly spent by local authorities with £0.3 billion spent directly on waste-water management. Expenditure on waste and waste-water management accounted for 64.4 per cent of total government environmental protection expenditure. Expenditure on nature conservation rose 12.5 per cent to £0.7 billion in 2004. Expenditure on measures to protect the atmosphere and on climate change prevention fell slightly in 2004 compared with 2003. Government expenditure on other environmental protection activities, research and development, education and administration amounted to £1.1 billion, up from £0.9 billion spent in the previous year.

The majority of environmental protection expenditure is in the form of short-term programmes and as these become active and inactive there can be large movements in expenditure within the domains targeted by such programmes. However, overall environmental protection expenditure continues to increase year on year.

Estimates of public sector environmental protection expenditure are derived from the Public Expenditure Statistics Analysis database produced annually by H.M.Treasury.

Table 3.5 shows total environmental protection expenditure by all industries amounted to £3.4 billion in 2005, within this the two largest domains of expenditure were waste and wastewater management. These accounted for 66.2 per cent of total environmental protection expenditure. These data are compiled by Defra and a full analysis can be found on their website at http://www.defra.gov.uk/environment/statistics/envsurvey/index.htm

Last updated December 2007.

3.3 Environmental protection expenditure by public sector 2003

£ million

	Protection of ambient air and climate	Waste water management	Waste management	Protection of bio-diversity and landscape	Other abatement activities[1]	Research and development education and adminstration	Total environmental expenditure
Staff costs	84.0	142.7	613.7	306.8	37.4	149.4	1 334.1
Other running costs[2]	48.9	81.6	2 557.4	228.3	29.4	316.4	3 262.0
less							
Current income	–0.7	–1.8	–10.6	–0.7	–0.2	–1.5	–15.4
Net operating costs	**132.3**	**222.5**	**3 160.5**	**534.5**	**66.6**	**464.3**	**4 580.7**
Capital payments[3]	26.2	17.2	143.2	87.4	262.1	58.2	594.3
less							
Capital receipts	–	–	–10.7	–	–	–1.3	–12.1
Net capital expenditure	**26.2**	**17.2**	**132.5**	**87.4**	**262.1**	**56.9**	**582.3**
Current grants and subsidies							
to industry	24.8	–	2.3	31.0	–	25.0	83.2
to households	–	–	–	–	–	9.2	9.2
Capital grants and subsidies							
to public corporations	–	31.0	–	–	–	–	31.0
to industry	0.1	–	–	–	1.2	0.2	1.4
to households	130.0	–	–	–	0.9	–	130.9
Net transfers to the rest of the world	–	–	–	3.1	0.5	–	3.5
Net expenditure[2]	**313.3**	**270.7**	**3 295.3**	**656.0**	**331.2**	**555.7**	**5 422.2**

Source: ONS, HM Treasury

3.4 Environmental protection expenditure by public sector 2004

£ million

	Protection of ambient air and climate	Waste water management	Waste management	Protection of bio-diversity and landscape	Other abatement activities[1]	Research and development education and adminstration	Total environmental expenditure
Staff costs	89.8	152.6	656.0	328.0	39.9	159.7	1 426.1
Other running costs[2]	50.2	83.6	2 621.2	234.0	30.1	324.3	3 343.4
less							
Current income	–1.5	–3.7	–22.4	–1.4	0.3	–3.2	–32.5
Net operating costs	**138.5**	**232.5**	**3 254.8**	**560.6**	**69.7**	**480.9**	**4 737.0**
Capital payments[3]	43.4	28.6	238.0	145.2	435.5	96.8	987.4
less							
Capital receipts	–	–	–9.2	–	–	–1.1	–10.3
Net capital expenditure	**43.4**	**28.6**	**228.8**	**145.2**	**435.5**	**95.6**	**977.1**
Current grants and subsidies							
to industry	25.1	–	2.4	31.5	–	25.4	84.4
to households	–	–	–	–	–	8.2	8.2
Capital grants and subsidies							
to public corporations	–	70.8	–	–	–	–	70.8
to industry	0.2	–	–	–	3.4	0.4	4.1
to households	42.9	–	–	–	0.3	–	43.2
Net transfers to the rest of the world	–	–	–	1.1	0.2	–	1.3
Net expenditure[2]	**250.1**	**332.0**	**3 486.0**	**738.3**	**509.1**	**610.5**	**5 926.0**

1 Includes expenditure on the protection of soil and groundwater, on noise and vibration abatement, on protection against radiation and on other environmental protection activities.
2 Includes an allowance for the consumption of fixed capital.
3 Includes outlays on land.

Source: ONS, HM Treasury

3.5 Environmental protection expenditure in specified industries 2005

£ million

	Protection of ambient air and climate	Waste water management	Waste management	Protection of bio-diversity and landscape	Other abatement activities	Research and development education and adminstration	Total environmental expenditure
Mining and quarrying	37	97	57	4	28	3	226
Food, beverages and tobacco products	27	184	124	2	41	7	385
Textiles, clothing and leather products	12	36	25	1	8	2	84
Wood and wood products	15	5	35	1	6	1	62
Pulp and paper products, printing and publishing	9	70	117	12	23	2	233
Coke, petroleum and nuclear fuel	127	37	7	–	7	–	177
Chemicals and man made fibres	100	183	141	5	51	15	495
Rubber and plastic products	11	19	95	1	24	2	152
Other non metallic mineral products	35	15	23	1	13	1	88
Basic metals and metal products	37	56	92	3	25	3	215
Machinery and equipment	36	39	76	2	26	48	226
Electrical, medical and optical equipment	2	11	11	–	4	2	31
Transport equipment	43	46	67	1	24	3	184
Other manufacturing	5	23	32	–	4	1	64
Energy production and water	78	509	14	33	135	1	772
Total expenditure in extraction, manufacturing, energy and water supply industries	**573**	**1 330**	**914**	**66**	**419**	**91**	**3 391**

1 The figures in these tables fall outside the scope of National Statistics.
2 Components may not sum to totals due to rounding.

Source: Department for environment, food and rural affairs

Methodological notes

Contents

Oil and Gas reserves

Oil reserves include both oil and the liquids and liquefied products obtained from gas fields, gas-condensate fields and from the associated gas in oil fields. Gas reserves are the quantity of gas expected to be available for sale from dry gas fields, gas-condensate fields and oil fields with associated gas. Gas which is expected to be flared or used offshore is not included.

This publication uses new terminology introduced by the Department for Business Enterprise and Regulatory Reform (DBERR) to describe UK reserves of oil and gas. Descriptions are now more closely aligned to those used by the oil and gas industry in order to improve general understanding and ensure consistency. Reserves are classified into the following categories: reserves, potential additional reserves and undiscovered resources. Undiscovered resources relate to those resources as yet undiscovered but potentially recoverable in mapped leads. Potential additional reserves are defined as discovered reserves that are not currently technically or economically producible. Reserves are classified as discovered, remaining reserves which are recoverable and commercial. These can be subdivided into proven, probable or possible depending on confidence level.

Simulation models using Monte Carlo techniques are used each year by DBERR to assess the likely existence and size of undiscovered oil and gas fields on the UK continental shelf (UKCS). The assessments are presented as a range, but the limits of the range should not be regarded as maxima or minima. Estimates of the volume of undiscovered reserves have fluctuated considerably in recent years as new areas of UKCS have been subjected to statistical analysis and older areas have been reassessed. Estimates are published annually by the DBERR and are taken from the DBERR Brown Book[1].

The lower end of the range of total reserves shown in the table is the sum of estimated proven reserves and the lower end of the range of undiscovered resources for that year, net of cumulative production.

The upper end of the range of total reserves is the sum of estimated proven, possible and probable reserves, plus the upper end range of undiscovered resources, for that year, net of cumulative production.

The expected level of reserves is calculated as the sum of proven and probable reserves and the lower end of the range of undiscovered resources.

Other volume changes are calculated as the difference between the expected level of reserves at the start of the year less production within that year, and the estimated level of reserves at the start of the following year.

Life expectancy is calculated as the expected level of reserves at the end of the year divided by the current rate of annual extraction. This calculation gives an indication of the theoretical number of years for which extraction could be sustained at current levels. In practice, towards the end of the period, the rate of extraction is likely to decrease as individual oil and gas fields are exhausted, so the period of extraction will be longer than that implied by the life expectancy calculation.

1. *Department for Business Enterprise and Regulatory Reform http://www.dti.gov.uk/energy/statistics/publications/dukes/page39771.html*

Monetary valuation of oil and gas reserves

Expressing UK oil and gas reserves in monetary terms allows these subsoil assets to be compared with other economic entities. This provides a means for the commercial depletion of subsoil assets to be set against national income. The results in table 1.2 are shown in the form of a balance sheet.

Since observed market values for transactions *in situ* in their original state are not widely available, the present value method is used to put a monetary value on the physical stocks of assets. This is an indirect valuation method measuring the current value of the asset's future streams of income by discounting the expected future rent, often referred to as the economic rent or resource rent. The method relies on information about the size of resource rent, the number of years for which the rent is to be received and the social discount rate to be applied.

The resource rent is the net income from extraction defined as total revenue from sales less all costs incurred in the extraction process i.e. operating costs, depreciation of capital and an allowance for the return on capital. Decommissioning costs have not been included in these accounts. The rate of return on capital is estimated to be 8 per cent in real terms in line with Eurostat recommendations[1], but it is worth noting that the resulting valuations are very sensitive to variations in this estimate. A three point centred moving average is used for the calculation of the unit resource rent.

The time span until the complete exhaustion of the reserves is the period over which resource rents are discounted, using the Eurostat recommended social discount rate of 4 per cent. Using these assumptions it is possible to calculate a present value of the stocks of oil and gas reserves at the start and end of each year. The accumulation account then breaks down the change between the start-of-year balance and the end-of-year balance. While physical stocks may change only as a result of extraction and other volume changes such as reassessments, monetary stocks can change for a number of other reasons.

Extraction is equal to the total resource rent for the year, effectively reducing the present value of the stocks by that amount. Positive values for extraction are a result of estimated negative resource rents. Revaluation due to time passing takes account of the fact that, as we move forward in time, the period over which the future rents are discounted is one year less, thereby reducing the effect of discounting future incomes. Other volume changes are reassessments which change the estimated stock of recoverable reserves.

The change in the extraction path sets out in monetary terms the addition or subtraction to the present value arising from a change in the amounts assumed to be extracted each year.

The change in unit rent gives the change in the future stream of income resulting from a change in the estimated unit resource rent. Any negative stock values result from estimated negative resource rents and have been left in the table in order to show the results of the assumptions made in the calculations.

1. *European Commission (2000). Accounts for subsoil assets: Results of pilot studies in European countries, 2000. Office for Official Publication of the European Communities, Luxembourg*

Land cover

These estimates made within the account are based on the Countryside Survey 2000 (CS2000), which was a stratified sample survey that used detailed field recording and mapping to provide information on the stock and condition of habitats and landscapes in Great Britain in 1998. The survey covered both terrestrial and freshwater habitats but did not cover areas more than 75 per cent built up. A similar Northern Ireland Countryside survey (NICS2000) was also completed, but since comparable estimates for 1990 are not readily available, our data only covers Great Britain.

Using the results of the 1990 survey and CS2000, it is possible to estimate changes in the stock of land cover types between 1990 and 1998. Our data set out a summary of the main changes in land cover over the period, broken down by the type of change in the stock of land. There are various land cover types:

Woodland is dominated by trees which are more than 5 metres high when mature and which provide a canopy with a cover of greater than 25 per cent. It is divided between broad-leaved and mixed woodland (including yew woodland) and coniferous woodland.

Intensive agricultural land is divided into arable and horticultural land and improved grassland. Arable and horticultural land includes orchards and more specialist operations such as market gardening and commercial flower growing.

Semi-natural land includes neutral, calcareous and acid grassland (the classification of which depends upon the type of soil and the resulting types of vegetation communities); bracken and dwarf shrub heath (which are lands dominated by bracken, dwarf gorse or heath family species); wetlands such as fen, marsh, swamp and bog; and montane and coastal habitats.

The remaining land covered by the survey is classified as developed land and water bodies. Developed land consists principally of built up areas and gardens, but also includes inland rock (such as quarries and excavations as well as cliffs, screes, etc) and boundary and linear features such as hedgerows, walls and ditches as well as roads, tracks and railways.

Unsurveyed urban land is shown separately, in addition to sea and a small unclassified category.

Energy consumption

The Energy Consumption dataset gives estimates of total energy used by each industry and the proportion of total energy used from renewable resources. Detailed estimates of consumption of different fuel types by each sub-sector are given in the Carbon Fuel Use by 93 industries dataset.

Unit of measurement

The unit of measurement is tonne of oil equivalent (toe), which enables different fuels to be compared and aggregated. It should be regarded as a measure of energy content rather than a physical quantity. Standard conversion factors for each type of fuel are given in the "*Digest of UK Energy Statistics*" (DUKES).

Consumption of carbon fuels, energy used in transformation processes and losses in distribution

The consumption of carbon fuels and the related consumption of energy can be analysed from a number of different perspectives. In terms of atmospheric emissions, it may be helpful to identify which industrial sectors are actually consuming the carbon fuels that give rise to emissions.

From this perspective, fuels used by the electricity generation sector are attributed entirely to that sector, even though some of the energy is transformed into electricity. This analysis is shown in Part 1 of the table showing Energy Consumption.

In terms of energy consumption, it is possible to attribute energy used during the process of transformation into electricity, and the energy lost in distributing electricity to end users, either directly to the electricity generation sector, or indirectly to the consumers of energy. Parts 2 and 3 of the table in Energy Consumption consider energy consumption from both points of view. Part 2 allocates the consumption of energy directly to the immediate consumer of the energy, while Part 3 allocates these "electricity overheads" to the end user of the electricity.

Non-energy uses of fuels

Non-energy use of fuels includes, for example, chemical feedstocks, solvents, lubricants and road-making material. These uses have been excluded from the data.

Renewable energy sources

Renewable energy is defined to include solar power, energy from wind, wave and tide, hydroelectricity, and energy from wood, straw and sewage gas. Landfill gas and municipal solid waste combustion have been included within renewable energy for the purposes of defining energy sources in the context of sustainable development policy.

1. Department for Business Enterprise and Regulatory Reform. Digest of United Kingdom Energy Statistics. Various issues. HMSO/TSO
2. Department for Business Enterprise and Regulatory Reform. Energy Trends. Various issues. HMSO/TSO

Sources and methods for estimating consumption of energy by industrial sector

Data for estimating fuel consumption by industrial sectors are collected by DBERR and underlie the figures given in the "*Digest of UK Energy Statistics*"[1]. However, the figures shown in Energy Consumption differ from those given in the "*Digest of UK Energy Statistics*" (DUKES) in that:

Fuels used by the UK fishing fleet, UK international shipping and aircraft operators, and ships and aircraft used for UK military purposes, are included, whether or not they were purchased in the UK, whereas fuels purchased in the UK by non-resident operators are excluded;

Purchases of petrol and diesel abroad by UK motorists and road hauliers are included;

Non-energy uses of fuels for example, chemical feedstocks, solvents, lubricants and road-making material, are excluded. However, energy lost through gas leakage etc is included;

The classification of industrial sectors used in environmental accounts differ from that used in DUKES. In particular, the transport sector is defined to include only enterprises that provide transport services to other consumers (i.e. public transport operators, freight haulage companies, etc.). The energy consumed by households' use of private cars is allocated to the domestic sector;

The allocation of energy use to particular industries is primarily based on DUKES data. However, for certain industries better estimates are used as published by DBERR in Energy Trends. Differences in publication times may result in minor reconciliation anomalies between ONS and DBERR energy data.

Reference

1. Department for Business Enterprise and Regulatory Reform. Digest of United Kingdom Energy Statistics. Various issues. HMSO/TSO

Overview to Atmospheric Pollutants

The UK is required to report emissions under different international agreements for key air pollutants covered by the National Atmospheric Emissions Inventory (NAEI) and greenhouse gases (GHG) covered by the UK GHG inventory. The National Environmental Technology Centre (Netcen) maintains the National Atmospheric Emissions Inventory.

There is a wide range of pollutants that contribute emissions to the atmosphere. They include greenhouse gases and substances that are directly toxic such as heavy metals. These pollutants can be grouped according to their contribution to environmental themes such as climate change and acid rain.

Each year the Environmental Accounts present estimates of pollutants directly emitted to the atmosphere by each industrial sector. The figures are on a National Accounts basis - they include emissions generated by UK households and companies in the UK and emissions from UK residents' transport and travel activities abroad. They exclude emissions generated by non-residents transport and travel in the UK. The data are therefore on a different basis from estimates previously published by the Department for Environment, Food and Rural Affairs (Defra) under the UK's Kyoto Protocol obligations. The Kyoto basis covers emissions from UK territory only and excludes emissions from international aviation and shipping. For a reconciliation of the different measures see table 2.4.

Changes in atmospheric emissions are compared to 1990 as this is the base year used in the Kyoto Protocol.

The Greenhouse effect (Climate change)

Greenhouse gases are transparent to natural light from the sun and relatively opaque to infra-red radiation from the Earth. Therefore, they trap some of the Earth's infra-red radiation and radiate it back to Earth. As a result, the Earth's temperature is kept at about 15^{C} by the atmospheric blanket. Without this naturally occurring greenhouse effect the Earth's temperature would be about minus 18^{C} - too cold for human life.

Although most greenhouse gas occur naturally, some are man-made. Since the industrial revolution, human activity has led to an increase in both the natural and man-made gases, especially carbon dioxide. There is growing consensus that the rise in greenhouse gas emissions has led to changes in the global atmosphere, so called global warming. The greenhouse gases included in the atmospheric emissions accounts are those covered by the Kyoto Protocol:

Carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.

To aggregate the greenhouse gases covered in the accounts, a weighting based on the relative global warming potential (GWP) of each of the gases is applied, using the effect of carbon dioxide over a 100 year period as a reference. This gives methane a weight of 21 relative to carbon dioxide and nitrous oxide a weight of 310 relative to carbon dioxide. Sulphur hexafluoride has a GWP of 23,900 relative to carbon dioxide. The GWP of the other fluorinated compounds varies according to the individual gas.

Greenhouse gas emissions are sometimes shown in terms of carbon equivalent rather than carbon dioxide equivalent. To convert from carbon dioxide equivalent to carbon equivalent it is necessary to multiply by 12/44.

Acid Rain Precursors

The term ‘acid rain’ describes the various chemical reactions acidic gases and particles undergo in the atmosphere and may be transported long distances before being deposited as wet or dry deposition. When deposited the hydrogen ions may be released causing acidification. These dilute acids damage ecosystems and buildings. The gases covered are sulphur dioxide, nitrogen oxides and ammonia.

Attributing emissions to industrial sectors

The emissions are weighted together using their relative acidifying effects. The weights, given relative to sulphur dioxide, are 0.7 for nitrogen oxides and 1.9 for ammonia. This is a simplification of the chemistry involved and there are a number of factors which can affect the eventual deposition and effect of acid rain. There may be an upward bias on the weights of the nitrogen-based compounds in terms of damage to ecosystems.

National Atmospheric Emissions Inventory (NAEI) projections of future emissions are an increasingly important requirement for UK government policy-making. National estimates of emissions are calculated across all economic sectors, e.g. industry, domestic use. The disaggregation of national estimates of emissions to industrial sectors is based upon an initial disaggregation provided by the National Environmental Technology Centre (Netcen).

Emissions were estimated by multiplying fuel consumption by emissions factors and adding releases unrelated to fuel use such as methane arising from landfill and collieries.

The NAEI data is used to identify the main processes and industries responsible for the emissions. These are then allocated to individual sectors on the basis of information from a variety of sources. For example, emissions from diesel use by HGVs is allocated to sectors using vehicle mileage data from the Department for Environment, Food and Rural Affairs (Defra). Expenditure information is also used, for example emissions arising from the use of various industrial coatings (e.g. general industrial, heavy duty and vehicle refinishing) are allocated to relevant sectors in proportion to each sector’s expenditure on paints, varnishes and similar coatings, printing ink and mastics, using National Accounts Input-Output supply and use tables as the main source.

Notes on available data

This kind of analysis is based on linking the environmental accounts data with the economic data generated by the National Accounts. Two datasets are available:

- A series of annual spreadsheets, for 1990 to 2005, each including three tables covering economic use tables, atmospheric emissions, electricity use and fossil fuel use across 76 industrial sectors. The use table shows the value of the consumption of these products and services by each industry and by final consumers.

- A set of tables covering estimates for 1993 (produced in 1997). The use table shows products and services used by each economic sector. The environmental input-output tables provide information about the direct and indirect emissions of atmospheric pollutants for 91 industrial sectors. Also, specialised analytical tables can be used to model different policy scenarios and to investigate the impact of changes in demand for products.

Material flows

Material flow accounts record the total mass of natural resources and products that are used by the economy, either directly in the production and distribution of products and services, or indirectly through the movement of materials which are displaced in order for production to take place.

A material flow account balances the inputs (extraction of natural resources from the UK environment, and imports of goods) with the outputs (wastes, emissions to air and water, exports) and accumulation (in terms of new buildings etc) within the economy.

The direct inputs of materials into the economy derive primarily from domestic extraction, that is from biomass (agricultural harvest, timber, fish and animal grazing), fossil fuel extraction (such as coal, crude oil and natural gas) and mineral extraction (metal ores, industrial minerals such as pottery clay, and construction material such as crushed rock, sand and gravel).

The direct input of materials from domestic sources is supplemented by the imports of products, which may be of raw materials such as unprocessed agricultural products, but can also be semi-manufactured or finished products. In a similar way the UK exports raw materials, semi-manufactured and finished goods which can be viewed as inputs to the production and consumption of overseas economies.

Water is used so widely and in such quantities that its inclusion in the accounts tends to obscure other resource use. For this reason, the accounts only include the water that is contained in products (e.g. agricultural produce and imported beverages). Water for other consumptive uses (cleaning or irrigation) and in situ uses (such as hydroelectric power) is excluded from these accounts.

Hidden flows measure the quantity of material displaced by the process of extraction but not actually used in the production of goods and services. Indirect flows measure the quantity of material associated with the imports of raw and semi-processed goods into the UK. Both hidden and indirect flows are measured indirectly by applying coefficients for particular materials and goods to the estimated levels of mass associated with domestic and overseas extraction. Therefore, there is a direct relationship between hidden flows and actual extraction. Levels are sensitive to assumptions embodied in the particular hidden or indirect flow coefficient used. Examples of hidden flows are unused extraction from mining and quarrying (also known as overburden), discarded material from harvesting (e.g. wood harvesting losses such as timber felled but left in the forests) and soil and rock moved as a result of construction and dredging.

Summary aggregates

There are a number of indicators which can be used to summarise the flows of materials into and out of the economy. Material Flows show three of the main indicators used to measure inputs.

The **Direct Material Input (DMI)** measures the input of materials directly used by the economy, that is all materials that form part of products or are used in production and consumption activities. DMI equals used extraction in the UK (including that which is used or contained in exports) plus imports.

Domestic material consumption (DMC) measures the total amount of material directly consumed by the economy. It is the sum of domestic extraction and imports less exports

The **Total Material Requirement (TMR)** measures the total material basis of the economy, that is the total direct and indirect resource requirements of all the production and consumption activities. TMR includes the amount of used extraction in the UK, the imports into the UK and the resulting indirect or hidden flows associated with extraction in the UK and imports from other countries. Although TMR is widely favoured as a resource use indicator, the estimates of indirect flows are less reliable than those for materials directly used by the economy, and it can be argued that it double-counts trade flows, in that materials used both in the production of imports and in the production of exports are included. The indicator therefore needs to be considered alongside other indicators.

The **Physical Trade Balance (PTB)** measures the difference between the total mass of exports and the total mass of imports. This can be used to understand the international relationship of material use in the UK.

Sources and methods

Data on the yields of agriculture, forestry and fishing comes from the Food and Agriculture Organisation (FAO)[1].

Mineral extraction data has been taken from the *UK Minerals Yearbook*[2] and information on the mass of imports and exports has been taken from trade information compiled by HM Revenue and Customs[3].

Factors applied to give estimates of the amounts of unused material moved for each tonne of used material have been taken from research carried out by the Wuppertal Institute on behalf of the Department for Environment, Food and Rural Affairs (Defra)[4].

The methodology used to compile the account is also based upon the Wuppertal Institute's research.

1. Food and Agricultural Organisation (FAO), available at http://apps.fao.org

2. British Geological Survey (2006). UK Minerals Yearbook 2006

3. HM Revenue and Customs trade data, available at: www.uktradeinfo.com

4. Wuppertal Institute for Climate, Environment and Energy (2002). Resource use and efficiency of the UK economy. See the Defra website at: http://www.defra.gov.uk/environment/statistics/waste/research/mfa/index.htm.

Radioactive Waste

Figures for stocks of waste are only available from inventories for 1991, 1994, 1998, 2001 and 2004. These are classified:

High level waste comes from the reprocessing of irradiated nuclear fuel. It accounts for over 95 per cent of all the radioactivity in waste.

Intermediate level waste from sources such as nuclear reactor components, has a lower radioactivity content and heat output than high level waste, but a radioactivity content which exceeds the upper limits for low level waste.

Low level waste such as discarded protective clothing, up to and including 1993, are net waste volumes and from 1994 are packaged waste volumes. A breakdown by source is not available after 1993.

Data are further classified by the condition in which the radioactive waste is stored:

'As stored' refers to the form in which the waste is currently stored, except for low level waste, which is the estimated volume after supercompaction. Most low level waste is in short term storage prior to disposal.

'When conditioned' is the estimated volume when waste is converted into a form in which it is placed in long term storage. These estimates should be treated as indicative only.

Estimated total current and further radioactive waste arisings includes volumes to be occupied by all stocks that have arisen so far plus those likely to arise during the known life of the nuclear program (see Nirex report UK Radioactive Waste Inventory at www.nirex.co.uk for more detail regarding assumptions used).

Supercompaction was introduced in 1995 for all wastes sent to the radioactive waste repository at Drigg. This has significantly reduced volumes of disposals which no longer take place in trenches. Such waste is now immobilised in containers and placed in concrete vaults.

Government revenues from environmental taxes

The Environmental taxes table shows the amounts raised in environmental taxes between 1993 and 2006.

Definition of an environmental tax

An environmental tax is defined as a tax whose base is a physical unit such as a litre of petrol, or a proxy for it, for instance a passenger flight, that has a proven specific negative impact on the environment. By convention, in addition to pollution related taxes, all energy and transport taxes are classified as environmental taxes. This definition has been agreed by international experts and adopted by the Statistical Office of the European Communities (Eurostat) and Organisation for Economic Co-operation and Development (OECD). It enables analysis to be based on the effects of taxes rather than the aims behind their introduction, i.e. the aim of a tax for raising government revenue rather than reducing environmental degradation does not preclude it from being defined as an environmental tax.

Nevertheless, the interpretation and use of measures of environmental taxes need care. In particular, the levels of revenues from environmental taxes do not necessarily indicate the relative importance or the success of environmental policy. High environmental tax revenues can result either from high rates of taxes or from high levels of environmental problems (e.g. pollution) leading to a large tax base. The broad measure of revenues can also fail to capture the effect of the differential rates that encourage a shift away from higher impact behaviour (such as the use of leaded petrol).

Taxes on energy products include duties on hydrocarbon oils used in road vehicles, the main ones being ultra low sulphur petrol and ultra low sulphur diesel. Taxes on energy products also include those used for non-transport purposes (such as industrial gas turbines and heating installations, with a reduced rate for energy saving materials). The **fossil fuel levy** was levied on sales of electricity from fossil fuels and was used to compensate companies producing electricity from non-fossil fuel sources such as nuclear or renewable energy.

The **climate change levy**, which is a tax on non-domestic use of energy, was introduced in April 2001. The levy applies to the suppliers of the following energy types: electricity, natural gas as supplied by a gas utility, petroleum and hydrocarbon gas in a liquid state, coal and lignite, coke and semi-coke of coal or lignite, and petroleum coke. The rates of the levy are based on the type and quantity of fuel supplied, with a range of relief and exemptions available.

VAT on duty is calculated as a fixed proportion (in most cases 17.5 per cent) of the duty paid on hydrocarbon oils. In practice much of this VAT will be reclaimed by business, but it could be argued that the total will eventually be paid when the final product or service is purchased.

Taxes on road vehicles include Vehicle Excise Duty, which keepers of motor vehicles can pay on either a six monthly or annual basis. There have been various changes to this duty over recent years. Most recently, as from 1 May 2002, private cars, taxis and light goods vehicles registered before 1 March 2001 with an engine size up to and including 1549cc are subject to a lower tax than cars with engine sizes greater than 1549cc. The same vehicle types registered on or after 1 March 2001 are taxed according to the level of carbon dioxide emissions. This is now presented broken down by payments from businesses and households. Car tax was payable on purchases of new cars, up until 1993 when it was discontinued.

Hydrobenefit was introduced in 1991 to protect energy consumers in remote areas, especially the Scottish Highlands and Islands, from excessive charges resulting from the increased costs involved in supplying those areas.

Air passenger duty was introduced on 1 November 1994. It applies to the carriage from a UK airport of chargeable passengers on chargeable aircraft at two different rates. The lower rate is charged where passengers are travelling to a UK destination or within the European Economic Area (EEA) and the higher rate applies in all other cases. On the year of introduction, the lower and higher rates of duty were £5 and £10 respectively. From 1 April 2001, standard rates of £10 for EEA destinations and £40 for other destinations have been applied. There are also reduced rates of duty for the lowest class of travel on any flights.

Landfill tax was introduced in October 1996 and aims to encourage waste producers to produce less waste, recover more value from waste e.g. through recycling or composting and to use more environmentally friendly methods of waste disposal. The tax applies to active and inactive (inert) waste disposed of at landfill sites. Generally when waste is committed to landfill it undergoes physical, chemical or biological transformations which then react with surrounding matter. Known as leaching, this process can give rise to environmental damage and harm human health. Waste classified as inactive has insignificant levels of leachability, pollutant content and ecotoxicity. Types of waste excluded from this tax include dredgings, disposals from mines and quarries and also waste resulting from the clearance of contaminated land. A standard rate of tax is levied on active waste, this was introduced at the rate of £7.00 per tonnes and has since risen to £14 per tonne in 2003-04. This rate will subsequently be increased each year until it reaches a medium to long term rate of £35 per tonne. A lower rate of tax is levied on inert waste, which has remained at £2.00 per tonne from the year of introduction.

The **aggregates levy** was introduced on 1 April 2002. The objective of this tax is to address the environmental costs associated with quarrying operations (noise, dust, visual intrusion, loss of amenity and loss to biodiversity), by reducing the demand for aggregate and encouraging the use of alternative materials where possible e.g. the use of waste glass and tyres in aggregate mixes. The tax applies to the commercial exploitation of sand, gravel and rock and includes aggregate dredged from the seabed within UK territorial waters. It is a specific tax, charged at £1.60 per tonne.

There is a wide range of exemptions for some quarried or mined products e.g. coal, metal ores, industrial minerals and for minerals used in the production of lime and cement and for exports of aggregates. Imports of aggregates are taxed upon first sale or use in the UK.

Environmental taxes breakdown by 13 industries are based on general government environmental taxes data and unpublished Input-Output data for taxes on products and production, that are informed by the latest available Supply-Use tables. From these sources it is possible to estimate allocations of environmental taxes to individual industries. A more detailed account of the methods used in this analysis is published in Economic Trends August 2004 edition.

Environmental protection expenditure

Estimates of environmental protection expenditure should be regarded as approximate orders of magnitude only. Because of this qualification, the estimates shown fall outside the scope of National Statistics.

Comparisons with previous surveys

The information on spending by industries in 2005, which is summarised in Environmental protection expenditure in specified industries, 2005 comes from a regular series of surveys conducted by the URS Corporation on behalf of Defra. The estimates from this survey and the earlier surveys should be regarded as very approximate and any comparisons between the results should be treated with care.

Definition of expenditure

Environmental protection expenditure is defined as capital and operational expenditure incurred because of, and which can be directly related to, the pursuit of an environmental objective. Spending on installations and processes which are environmentally beneficial, but which also produce revenue (or savings) exceeding expenditures, is excluded on the grounds that it is likely to have been carried out for commercial not environmental reasons. Also excluded are expenditures on natural resource management (e.g. fisheries and water resources), on the prevention of natural hazards (e.g. flood defence), on the provision of access and amenities to National Parks etc and on the urban environment.

The spending has been classified by the following groups of environmental concerns:

Protection of ambient air and climate
Waste water management
Waste management
Protection of biodiversity and landscapes
Other abatement activities such as on the protection of soil and groundwater, protection against radiation and noise and vibration abatement
Other environmental expenditure (on research and development, education and administration).

The spending shown in Public sector environmental protection expenditure, 2003 - 2004 has also been classified by the following types of expenditure:

- Current costs, including staff costs (compensation of employees), other on-going expenditure on purchases of goods and services and the estimated consumption of fixed capital
- Capital expenditure or investment including outlays on land and on the additions of new durable goods to the stock of fixed assets for environmental protection
- Income from sales, fees and charges for the provision of current or capital goods and services, such as fees for waste removal, but excluding taxes
- Current and capital transfers to other sectors of the economy
- Net transfers to and from the Rest of the World, in the form of aid or other grants, net of grants received from the EU.

There are five main categories of spending in Environmental protection expenditure in specified industries, 2003:

- End-of-pipe-investment is defined as add-on installations and equipment which treats or controls emissions or reduces waste materials generated by the plant, but which does not affect production processes.
- Integrated processes are adaptations or changes to production processes in order to generate fewer emissions or waste materials.
- In-house operating expenses cover operating costs necessary to run end-of-pipe or integrated facilities.
- Current payments made to others include all payments to third parties for environmental services, including payments for the treatment or removal of solid waste, water service company charges for sewage treatment, payments to contractors for the removal or treatment of waste waters, and payments made to environmental regulatory authorities.
- Research and development expenditure includes both in-house research and development and amounts paid to others such as trade associations and consultants.

Sources

Environmental protection expenditure in specified industries gives figures for spending by the extraction, manufacturing, energy production and water supply industries. They are drawn from a survey for 2005 carried out on behalf of the Department for Environment, Food and Rural Affairs (Defra) by URS Corporation Ltd[1]

Environmental protection expenditure by the public sector gives estimates for expenditures by the public sector and is based on information obtained from a variety of sources such as the Public Expenditure Database and from various government departments, local authorities and the devolved administrations.

Data for industry and public sector environmental protection expenditure should not be added together as differing classification procedures make comparisons problematic.

1. *URS Corporation LTD (2007).* Environmental Protection by Industry: 2005 UK Survey
http://www.defra.gov.uk/environment/statistics/envsurvey/index.htm

Annex 1: Atmospheric pollutants

Greenhouse gases

There is a growing consensus that the rise in concentrations of greenhouse gases in the atmosphere has led to changes in the global climate system. The greenhouse gases included in the atmospheric emissions accounts are those covered by the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

Carbon dioxide (CO_2) emissions mainly come from the combustion of fossil fuels, but it is also produced in some industrial processes such as the manufacture of cement. Carbon dioxide is a long-lived gas remaining in the atmosphere for between 50 and 200 years. It is the main anthropogenic greenhouse gas.

Methane (CH_4) is produced when organic matter is broken down in the absence of oxygen. Large quantities are produced by enteric fermentation in cattle and sheep, by the spreading of animal manure and from organic waste deposited in landfill sites. Methane is also emitted in coal mining, oil and gas extraction and gas distribution activities. Methane is a significant greenhouse gas.

Nitrous oxide (N_2O) is released in a few industrial processes and from the soil when nitrogenous fertilisers are applied in agriculture and horticulture. These are the main anthropogenic sources. It is a long-lived pollutant, lasting about 120 years in the atmosphere and is a potent greenhouse gas.

Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) are artificial fluids that contain chlorine and/or fluorine. Because of their low reactivity and non-toxicity they were widely used as refrigerants, foam blowing agents, aerosol propellants and solvents.

To aggregate the greenhouse gases covered in the accounts, a weighting based on the relative global warming potential (GWP) of each of the gases is applied, using the effect of CO_2 over a 100 year period as a reference. This gives methane a weight of 21 relative to relative to CO_2 and nitrous oxide a weight of 310 relative to CO_2 SF_6 has a GWP of 23,900 relative to CO_2. The GWP of the other fluorinated compounds varies according to the individual gas.

Greenhouse gas emissions are sometimes shown in terms of carbon equivalent rather than CO_2 equivalent. To convert from CO_2 equivalent to carbon equivalent it is necessary to multiply by 12/44.

Acid rain precursors

The term ‘acid rain’ describes the various chemical reactions which acidic gases and particles undergo in the atmosphere. The gases may be transported long distances before being deposited as wet or dry deposition. When deposited, hydrogen ions may be released, forming dilute acids, which damage ecosystems and buildings. The gases covered are sulphur dioxide (SO_2), nitrogen oxides (NO_x) and ammonia (NH_3).

The emissions are weighted together using their relative acidifying effects. The weights, given relative to SO_2, are 0.7 for NO_x and 1.9 for NH_3. This is a simplification of the chemistry involved, and there are a number of factors which can affect the eventual deposition and effect of acid rain. There may be an upward bias on the weights of the nitrogen-based compounds in terms of damage to ecosystems.

Ammonia (NH_3) is predominantly emitted from spreading animal manure and some fertilisers.

Nitrogen oxides (NO_x) arise when fossil fuels are burnt under certain conditions. High concentrations are harmful to health and reduce plant growth. Like sulphur dioxide, nitrogen oxides contribute to acid rain; nitrogen dioxide (NO_2) also plays a part in the formation of ground ozone layer.

Sulphur dioxide (SO_2) is produced when coal and some petroleum products containing sulphur impurities are burnt. Sulphur dioxide is an acid gas that can cause respiratory irritation. It can damage ecosystems and buildings directly and is a major contributor to acid rain.

Other air pollutants

Benzene is released largely from the distribution and combustion of petrol. It is a carcinogen which has also been found to cause bone-marrow depression and consequent leukopenia (depressed white blood cell count) on prolonged exposure.

1,3-Butadiene is a colourless, gaseous hydrocarbon. It is produced by dehydrogenation of butene, or of mixtures of butene and butane; it may also be made from ethanol. 1,3-butadiene is believed to be a carcinogen, for which the safe level is not known. Emissions of 1,3-butadiene arise from combustion of petroleum products and in its manufacture of synthetic rubber, nylon and latex paints in the chemical industry. 1,3-butadiene is not present in petrol but is formed as a by-product of combustion. The increasing use of catalytic converters through the 1990's has caused a significant reduction in emissions from the road transport sector.

Carbon monoxide (CO) is produced in small quantities when fossil fuel is burnt with insufficient oxygen for complete combustion. At high concentrations carbon monoxide is toxic.

Non-methane volatile organic compounds (NMVOCs) cover a variety of chemicals, many of which are known carcinogens. Emissions of NMVOCs arise from the deliberate and incidental evaporation of solvents (e.g. in paints and cleaning products), from accidental spillage and from non-combustion of petroleum products. The environmental accounts include natural emissions of NMVOCs from managed forests. NMVOCs play a role in the formation of ground level ozone, which can have an adverse effect on health. The NMVOC emissions include benzene and 1,3-butadiene.

PM_{10}s are smoke particles whose diameter is less than 10 microns. They are regarded as responsible for some physiological damage and have been linked to premature mortality from respiratory diseases.

Heavy Metals

Arsenic (As) is a naturally occurring element in the Earth's crust. It is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds and combines with carbon and hydrogen to form organic arsenic compounds. Inorganic arsenic compounds are mainly used to preserve wood. Organic arsenic compounds are used as pesticides, primarily on cotton plants.

Breathing high levels of inorganic arsenic can lead sore throat or irritated lungs. Ingesting high levels of inorganic arsenic can result in death. Lower levels of arsenic can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet. Skin contact with inorganic arsenic may cause redness and swelling.

Organic arsenic compounds are less toxic than inorganic arsenic compounds. Exposure to high levels of some organic arsenic compounds may cause similar effects as inorganic arsenic.

Cadmium (Cd) is a normal constituent of soil and water at low concentrations. Industrially, cadmium is used as an anti-friction agent, in alloys, semi-conductors, control rods for nuclear reactors and PVC and battery manufacture. The main sources of cadmium emissions are from waste incineration, and iron and steel manufacture. Emissions of cadmium have declined over recent years; this is mainly attributable to the decline in coal combustion.

Environmentally, cadmium is dangerous because many plants and some animals absorb it easily and concentrate it in tissues. Cadmium competes with calcium in the body and if levels are sufficient, it will displace calcium, causing embrittlement of bones and painful deformations of the skeleton. Cadmium also competes with zinc in the body and if levels of cadmium are high enough, cadmium will also displace zinc from enzymes in the body.

Chromium is a naturally occurring element, which can be found in rocks, animals, plants, soil and in volcanic dust and gases. Chromium is presented in several different forms. The most common forms are chromium (0), chromium (III), and chromium (VI). No taste or odor is associated with chromium compounds. Chromium (III) is an essential nutrient that helps the body use sugar, protein, and fat.

Breathing high levels of chromium (VI) can cause irritation to the nose, such as runny nose, nosebleeds and ulcers and holes in the nasal septum. Ingesting large amounts of chromium (VI) can cause stomach upsets and ulcers, convulsions, kidney and liver damage and even death. Skin contact with certain chromium (VI) compounds can cause skin ulcers. Some people are extremely sensitive to chromium (VI) or chromium (III). Allergic reactions consisting of severe redness and swelling of the skin have been noted.

Copper (Cu) is a reddish metal that occurs naturally in rocks, soil, water, and air. Copper also occurs naturally in plants and animals. Metallic copper can be easily molded or shaped. Metallic copper can be found in mixtures (called alloys) with other metals such as brass and bronze. Copper is also found as part of other compounds forming salts. Copper salts occur naturally, but are also manufactured. Copper compounds are commonly used in agriculture to treat plant diseases like mildew, for water treatment and, as preservatives for wood, leather, and fabrics.

Mercury (Hg) emissions mainly come from waste incineration, the manufacture of chlorine in mercury cells, non-ferrous metal production and coal combustion. Emissions of mercury have declined over recent years due to improved controls on mercury cells and their replacement by diaphragm cells and the decline of coal use. Due to the volatility of mercury, if levels are sufficiently high, compounds containing mercury attack and destroy various parts of the body, particularly teeth, lung tissues and intestines.

Nickel (Ni) can be combined with other metals, such as iron, copper, chromium, and zinc, to form alloys. Most nickel is used to make stainless steel. Nickel can be found in all soil and is emitted from volcanoes. It can also found in meteorites and on the ocean floor. Nickel and its compounds have no characteristic odor or taste.

The most common harmful health effect of nickel in humans is an allergic reaction. People can become sensitive to nickel when jewellery or other things containing it are in direct contact with the skin. People who drank water containing high

amounts of nickel had stomachaches and suffered adverse effects to their blood and kidneys.

Selenium (Se) is a naturally occurring mineral element that is distributed widely in nature in most rocks and soils. Most processed selenium is used in the electronics industry, but it is also used as a nutritional supplement in the glass industry. Also, as a component of pigments in plastics, paints, enamels, inks and rubber. Radioactive selenium is used in diagnostic medicine.

Selenium has both beneficial and harmful effects to human. Low doses of selenium are needed to maintain good health. However, exposure to high levels can cause adverse health effects. Short-term oral exposure to high concentrations of selenium may cause nausea, vomiting and diarrhoea. Chronic oral exposure to high concentrations of selenium compounds can produce a disease called selenosis.

Brief exposures to high levels of elemental selenium or selenium dioxide in air can result in respiratory tract irritation, bronchitis, difficulty breathing and stomach pains. Longer-term exposure to either of these air-borne forms can cause respiratory irritation, bronchial spasms, and coughing.

Vanadium (V) is a compound that occurs in nature and is often found as crystals. Pure vanadium has no smell. Vanadium and vanadium compounds can be found in the Earth's crust and in rocks, some iron ores and crude petroleum deposits. Vanadium in the form of vanadium oxide is a component in special kinds of steel that is used for automobile parts. Vanadium is also mixed with iron to make important parts for aircraft engines. Small amounts of vanadium are used in making rubber, plastics, ceramics and other chemicals. Breathing high levels of vanadium can cause lung irritation, coughing, wheezing, chest pain, runny nose and a sore throat.

Zinc (Zn) can be found in air, soil and water and is present in all foods. Zinc combines with other elements to form zinc compounds. Common zinc compounds found at hazardous waste sites include zinc chloride, zinc oxide, zinc sulphate and zinc sulfide. Zinc compounds are widely used in industry to make paint, rubber, dyes, wood preservatives and ointments. Large doses taken by mouth even for a short time can cause stomach cramps, nausea and vomiting. It can cause anemia and decrease the levels of your good cholesterol when it has been taken for long time. Inhaling large amounts of zinc (as dusts or fumes) can cause a specific short-term disease called metal fume fever.

Annex 2: Revisions since previous publication on 1 June 2007

Updates and revisions

The environmental accounts have been updated since the spring 2007 edition to incorporate more recent information and revisions to previously published estimates. The following accounts have been either updated or revised:

Environmental protection expenditure by industry
Incorporation of the results of Department for the Environment Food and Rural Affairs' environmental protection expenditure survey for 2005.

Environmental taxes
Estimates have been updated to include latest national accounts information

Forestry
Data incorporating latest consumption figures consistent with Forestry Commission publications.

Material flows
The material flow accounts estimates updated to take on latest data from the British Geological Society, HM Revenue and Customs and the Food and Agriculture Organisation.

Oil and gas reserves
UK Oil and gas estimates of remaining reserves and monetary balance sheets updated and revised to incorporate latest data and revisions published by DBERR and new national accounts data published by ONS.

The next publication of the Environmental Accounts is scheduled for June 2008. Anticipated updates and revisions include:

Atmospheric emissions
Inclusion of the latest estimates for 2006 from Netcen and revisions to earlier periods.

Energy consumption
Inclusion of the latest estimates for 2006 and revisions to earlier periods.

Environmental taxes
Estimates have been updated to include latest national accounts information

Oil and gas reserves
UK Oil and gas estimates of the monetary balance sheets updated and re vised to incorporate latest data and revisions published by ONS national accounts.

Public sector environmental protection expenditure
Latest estimates based on data derived from the HM Treasury publication Public Expenditure Statistics Analysis (PESA) 2008.

Industrial classifications by type

Environ-mental Accounts codes	Industry	SIC92	IO codes	Agg_ Sectors	NACE
01	Agriculture, hunting and related service activities	01	1	AB	1
02	Forestry, logging and related service activities	02	2	AB	2
03	Fishing, operation of fish hatcheries and fish farms	05	3	AB	5
04	Mining of coal, lignite and peat	10	4	C	10
05	Extraction of crude petroleum and natural gas	11	5	C	11
06	Mining of metal ores	13	6	C	13
07	Other mining and quarrying	14	7	C	14
08	Manufacture of food products and beverages	15	8-19	D	15
09	Manufacture of tobacco products	16	20	D	16
10	Textiles	17	21-27	D	17
11	Manufacture of wearing apparel; dressing and dyeing of fur	18	28	D	18
12	Leather tanning, luggage and footwear	19	29-30	D	19
13	Timber, wood products excl. furniture; cork and straw	20	31	D	20
14	Pulp, pape and paper products	21	32	D	21
15	Publishing, printing and production of recorded material	22	33-34	D	22
16	Coke oven products	23.1	35	D	
17	Refined petroleum products	23.2		D	
18	Processing nuclear fuel	23.3		D	23
19	Industrial gases, dyes, pigments	24.11, 24.12	36	D	
20	Other inorganic chemicals	24.13	37	D	
21	Other organic basic chemicals	24.14	38	D	
22	Fertilisers and nitrogen compounds	24.15	39	D	
23	Plastics, synthetic rubber, primary form	24.16, 24.17	40	D	
24	Pesticides, agro-chemicals	24.2	41	D	
25	Paints, varnishes, printing ink etc.	24.3	42	D	
26	Pharmaceuticals and botanical products	24.4	43	D	
27	Soap and detergents, cleaning and toilet prepara-tions	24.5	44	D	
28	Chemical products nes	24.6	45	D	
29	Man-made fibres	24.7	46	D	24
30	Rubber products	25.1	47	D	
31	Plastic products	25.2	48	D	25
32	Glass and glass products	26.1	49	D	
33	Ceramic goods	26.2, 26.3	50	D	
34	Structural clay products	26.4	51	D	
35	Cement, lime and plaster	26.5	52	D	
36	Articles of concrete, stone, other non-metallic mineral products	26.6, 26.8	53	D	26
37	Iron and steel	27.1, 27.3	54	D	

Environ-mental Accounts codes	Industry	SIC92	IO codes	Agg_ Sectors	NACE
38	Non-ferrous metals excl. aluminium	27.41, 27.43-27.45	55	D	
39	Aluminium	27.42		D	
40	Casting of metals	27.5	56	D	27
41	Fabricated metal products, except machinery	28	57-61	D	28
42	Machinery and equipment	29	62-68	D	29
43	Office machinery and computers	30	69	D	30
44	Electrical machinery and apparatus	31	70-72	D	31
45	Radio, television and communications	32	73-75	D	32
46	Medical, precision and optical instruments, watch-es and clocks	33	76	D	33
47	Motor vehicles, trailers and semi-trailers	34	77	D	34
48	Other transport equipment	35	78-80	D	35
49	Manufacture of furniture, toys, sports equipment, other products	36	81-83	D	36
50	Recycling	37	84	D	37
51	Electricity production - gas	40.1	85	E	
52	Electricity production - coal			E	
53	Electricity production - nuclear			E	
54	Electricity production - oil			E	
55	Electricity production - other			E	
56	Gas distribution; steam and hot water supply	40.2, 40.3	86	E	40
57	Water supply	41	87	E	41
58	Construction	45	88	F	45
59	Garages, car show rooms	50	89	GH	50
60	Wholesaler trade and commission trade except motor vehicles	51	90	GH	51
61	Retail and repair trade, except motor vehicles	52	91	GH	52
62	Hotels and restaurants	55	92	GH	55
63	Railways	60.1	93	I	
64	Buses and coaches	60.21/ 1, 60.23	94	I	
65	Tubes and trams	60.21/2		I	
66	Taxis operation	60.22		I	
67	Freight transport by road	60.24		I	
68	Transport via pipeline	60.3		I	60
69	Water transport	61	95	I	61
70	Air transport	62	96	I	62
71	Supporting and auxiliary transport activities, travel agencies	63	97	I	63

Environ-mental Accounts code	Industry	SIC92	IO codes	Agg_ Sector	NACE
72	Post and telecommunications	64	98-99	I	64
73	Financial Intermediation, except insurance and pension funds	65	100	JK	65
74	Insurance and pensions	66	101	JK	66
75	Activities auxiliary to financial intermediation	67	102	JK	67
76	Real estate activities	70	103-105	JK	70
77	Renting of machinery	71	106	JK	71
78	Computer and related activities	72	107	JK	72
79	Research and development	73	108	JK	73
80	Other business activities	74	109-114	JK	74
81	Public administration - not defense	75 not 75.22	115	L	
82	Public administration - defense	75.22		L	75
83	Education	80	116	MN	80
84	Health and veterinary services, social work	85	117-118	MN	85
85	Sewage treatment of liquid waste	90	119	O	
86	Solid waste			O	
87	Other sanitary services			O	90
88	Activities of membership organisations	91	120	O	91
89	Recreational, cultural and sporting activities	92	121	O	92
90	Other service activities; dry cleaning, hair dressing, funeral parlours	93	122	O	93
91	Private households with employed persons Extra-territorial organisations and bodies	95 99	123	O	95
92	Consumer expenditure - not travel		126	Z	
93	Consumer expenditure - travel		126	Z	
N	Natural World				