



Digest of United Kingdom Energy Statistics 2009

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Digest of United Kingdom Energy Statistics

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Monthly and quarterly data are also available for Energy, Solid fuels and derived gases, Petroleum, Gas and Electricity at:

www.decc.gov.uk/en/content/cms/statistics/source/source.aspx

Information on Energy Prices is available at:

www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx

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Introduction

I This issue of the Digest of United Kingdom Energy Statistics (DUKES) continues a series which commenced with the Ministry of Fuel and Power Statistical Digest for the years 1948 and 1949, published in 1950. The Ministry of Fuel and Power Statistical Digest was previously published as a Command Paper, the first being that for the years 1938 to 1943, published in July 1944 (Cmd. 6538).

II The current issue updates the figures given in the Department for Business, Enterprise & Regulatory Reform's (BERR) *Digest of United Kingdom Energy Statistics 2008*, published in July 2008.

III This printed and bound issue consists of seven chapters and four annexes. The first chapter deals with overall energy. The other chapters cover the specific fuels, combined heat and power and renewable sources of energy. The annexes cover conversion factors and calorific values, a glossary of terms, further sources of information and major events in the energy industries.

IV This Digest is also available on the internet. Some additional information appears on the internet only. The tables on the internet are provided in Microsoft Excel format. Most internet versions of the tables include data for earlier years, which are not provided in the printed copy publication. For example commodity and energy balances (see VII and VIII, below) for 1998 to 2005 are included on the internet, and tables that show five years in this printed version show eleven years in their internet form because page sizes are not a limiting factor. In addition, the following appear on the internet version only:

- Long term trends text and tables
- Major events from 1990 to 2009 - Annex D
(only Major events for 2007 to 2009 appear in the printed and bound version)
- Energy and the environment – Annex E
- UK oil and gas resources - Annex F
- Foreign trade – Annex G
- Flow charts – Annex H
- Energy balance: net calorific values – Annex I
- Heat reconciliation – Annex J

V Annual information on prices is included in the publication *Quarterly Energy Prices*. This is available together with *Energy Trends* on subscription from the Department of Energy and Climate Change (DECC). Further information on these publications can be found in Annex C.

VI Where necessary, data have been converted or adjusted to provide consistent series. However, in some cases changes in methods of data collection have affected the continuity of the series. The presence of remaining discontinuities is indicated in the chapter text or in footnotes to the tables.

VII Chapters 2, 3, 4, 5 and 7 contain production and consumption of individual fuels and are presented using *commodity balances*. A commodity balance illustrates the flows of an individual fuel through from production to final consumption, showing its use in transformation (including heat generation) and energy industry own use. Further details of commodity balances and their use are given in Annex A, paragraphs A.7 to A.42.

VIII The individual commodity balances are combined in an *energy balance*, presented in Chapter 1, *Energy*. The energy balance differs from a commodity balance in that it shows the interactions between different fuels in addition to illustrating their consumption. The energy balance thus gives a fuller picture of the production, transformation and use of energy showing all the flows. Expenditure on energy is also presented in energy balance format in Chapter 1. Further details of the energy balance and its use, including the methodology introduced in the 2003 Digest for heat, are given in Annex A, paragraphs A.43 to A.58.

IX Chapter 1 also covers general energy statistics and includes tables showing energy consumption by final users and an analysis of energy consumption by main industrial groups. Fuel production and consumption statistics are derived mainly from the records of fuel producers and suppliers.

X Chapters 6 and 7 summarise the results of surveys conducted by AEA Energy & Environment on behalf of DECC which complement work undertaken by DECC. These chapters estimate the contribution made by combined heat and power (CHP) and renewable energy sources to energy production and consumption in the United Kingdom.

XI Some of the data shown in this Digest may contain previously unpublished revisions and estimates of trade from HM Revenue and Customs and the Office for National Statistics. These data are included in Annex G.

Definitions

XII The text at the beginning of each chapter explains the main features of the tables. Technical notes and definitions, given at the end of this text, provide detailed explanations of the figures in the tables and how they are derived.

XIII Most chapters contain some information on 'oil' or 'petroleum'; these terms are used in a general sense and vary according to usage in the field examined. In their widest sense they are used to include all mineral oil and related hydrocarbons (except methane) and any derived products.

XIV An explanation of the terms used to describe electricity generating companies is given in Chapter 5, paragraphs 5.57 to 5.59.

XV Data in this issue have been prepared on the basis of the Standard Industrial Classification (SIC 2003) as far as is practicable. For further details of classification of consumers see Chapter 1, paragraphs 1.54 to 1.58.

XVI Where appropriate, further explanations and qualifications are given in footnotes to the tables.

Proposed change to use net calorific values when producing energy statistics

XVII A consultation was launched in the 2005 edition of the Digest seeking views of users as to whether Net Calorific Values (NCVs) should be used in place of Gross Calorific Values (GCVs). As a result of this consultation, DECC recognised that there are good arguments both for and against moving from GCV to NCV. However at present it has been concluded that there would be no demonstrable advantage to changing the method of presenting UK Energy statistics, and so GCVs continue to be used in this edition and will be used in future editions of the Digest. The fuel specific NCVs will continue to be published, and are shown in Annex A. The total energy balances on a net calorific basis are now being produced as part of the internet version of the Digest, Annex I.

Geographical coverage

XVIII The geographical coverage of the statistics is the United Kingdom. Shipments to the Channel Islands and the Isle of Man from the United Kingdom are not classed as exports. Supplies of solid fuel and petroleum to these islands are therefore included as part of United Kingdom inland consumption or deliveries.

Periods

XIX Data in this Digest are for calendar years or periods of 52 weeks, depending on the reporting procedures within the fuel industry concerned. Actual periods covered are given in the notes to the individual fuel chapters

Revisions

XX The tables contain revisions to some of the previously published figures, and where practicable the revised data have been indicated by an 'r'. The 'r' marker is used whenever the figure has been revised from that published in the printed copy of the 2008 Digest, even though some figures may have been amended on the internet version of the tables. Statistics on energy in this Digest are classified as National Statistics. This means that they are produced to high professional standards as

set out in the UK Statistics Authority's Code of Practice for Official Statistics. The Code of Practice requires that all the public bodies that produce official statistics "Publish a revisions policy for those outputs that are subject to scheduled revisions. Provide a statement explaining the nature and extent of revisions at the same time that they are released". The following statement outlines the policy on revisions for energy statistics.

Revisions to data published in the *Digest of UK Energy Statistics*.

It is intended that any revisions should be made to previous years' data only at the time of the publication of the Digest (ie in July 2009 when this Digest is published, revisions can be made to 2007 and earlier years). In exceptional circumstances previous years' data can be amended between Digest publication dates, but this will only take place when quarterly *Energy Trends* is published. The reasons for substantial revisions will be explained in the 'Highlights' sheet of the internet version of the table concerned. Valid reasons for revisions of Digest data include:

- revised and validated data received from a data supplier;
- the figure in the Digest was wrong because of a typographical or similar error.

In addition, when provisional annual data for a new calendar year (eg 2009) are published in *Energy Trends* in March of the following year (eg March 2010), percentage growth rates are liable to be distorted if the prior year (ie 2008) data are constrained to the Digest total, when revisions are known to have been made. In these circumstances the prior year (ie 2008) data will be amended for all affected tables in *Energy Trends* and internet versions of all affected Digest tables will be clearly annotated to show that the data has been up-dated in *Energy Trends*.

Revisions to 2009 data published in *Energy Trends* prior to publication in the 2010 edition of the *Digest of UK Energy Statistics*.

- All validated amendments from data suppliers will be updated when received and published in the next statistical release.
- All errors will be amended as soon as identified and published in the next statistical release.
- Data in energy and commodity balances format will be revised on a quarterly basis, to coincide with the publication of *Energy Trends*.

Further details on the UK Statistics Authority's Code of Practice for Official Statistics can be found at: www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html

Energy data on the internet

XXI Energy data are held on the energy area of the DECC web site, under "statistics". The Digest is available at www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx.

Information on further DECC energy publications available both in printed copy format and on the Internet is given in Annex C.

XXII The Department of Energy and Climate Change was created on 3 October 2008. This Department took over energy policy from the former Department for Business, Enterprise and Regulatory Reform (BERR) and climate change policy from the Department for Environment, Food and Rural Affairs (Defra). Within this publication references to DECC's predecessor Departments refer to BERR or Defra.

XXIII Short term statistics are published:

- monthly, by DECC on the Internet at www.decc.gov.uk/en/content/cms/statistics/source/source.aspx
- quarterly, by DECC in paper and on the internet in *Energy Trends*, and *Quarterly Energy Prices*: www.decc.gov.uk/en/content/cms/statistics/publications/publications.aspx
- quarterly, by DECC in Statistical Press Release which provides a summary of information published in *Energy Trends* and *Quarterly Energy Prices* publications: www.nds.coi.gov.uk/
- monthly, by the Office for National Statistics in the Monthly Digest of Statistics (Palgrave Macmillan).

To subscribe to *Energy Trends* and *Quarterly Energy Prices*, please contact Clive Sarjantson at the address given at paragraph XXIX. Single copies are available from the Publications Orderline, as given in Annex C, priced £6 for *Energy Trends* and £8 for *Quarterly Energy Prices*.

Table numbering

XXIV Page 10 contains a list showing the tables in the order in which they appear in this issue, and their corresponding numbers in previous issues.

Symbols used

XXV The following symbols are used in this Digest:

- .. not available
- nil or negligible (less than half the final digit shown)
- r Revised since the previous edition

Rounding convention

XXVI Individual entries in the tables are rounded independently and this can result in totals, which are different from the sum of their constituent items.

Acknowledgements

XXVII Acknowledgement is made to the main coal producing companies, the electricity companies, the oil companies, the gas pipeline operators, the gas suppliers, National Grid, the Institute of Petroleum, the Coal Authority, the United Kingdom Iron and Steel Statistics Bureau, AEA Energy & Environment, the Department for Environment, Food and Rural Affairs, the Department for Transport, OFGEM, Building Research Establishment, HM Revenue and Customs, the Office for National Statistics, and other contributors to the enquiries used in producing this publication.

Cover photograph

XXVIII The cover illustration used for this Digest and other DECC energy statistics publications is from a photograph by Peter Askew. It was a winning entry in the DTI News Photographic Competition in 2002.

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XXX For enquiries concerning particular data series or chapters contact those named on page 9 or at the end of the relevant chapter.

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July 2009*

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Tables as they appear in this issue and their corresponding numbers in the previous three issues

Chapter	2006	2007	2008	2009	Chapter	2006	2007	2008	2009		
ENERGY	-	-	-	1.1	GAS	4.1	4.1	4.1	4.1		
	-	-	1.1	1.2		4.2	4.2	4.2	4.2		
	-	1.1	1.2	1.3		4.3	4.3	4.3	4.3		
	1.1	1.2	1.3	-		-	4.4	4.4	4.4		
	1.2	1.3	-	-		-	-	4.5	4.5		
	1.3	-	-	-		ELECTRICITY	5.1	5.1	5.1	5.1	
	-	-	-	1.4			5.2	5.2	5.2	5.2	
	-	-	1.4	1.5			5.3	5.3	5.3	5.3	
	-	1.4	1.5	1.6			5.4	5.4	5.4	5.4	
	1.4	1.5	1.6	-			5.5	5.5	5.5	5.5	
	1.5	1.6	-	-			5.6	5.6	5.6	5.6	
	1.6	-	-	-			5.7	5.7	5.7	5.7	
	1.7	1.7	1.7	1.7			5.8	5.8	5.8	5.8	
	1.8	1.8	1.8	1.8			5.9	5.9	5.9	5.9	
	1.9	1.9	1.9	1.9			5.10	5.10	5.10	5.10	
	-	-	-	2.1			5.11	5.11	5.11	5.11	
	SOLID FUELS & DERIVED GASES	-	-	2.1		2.2	5.12	5.12	5.12	5.12	
		-	2.1	2.2		2.3	COMBINED HEAT AND POWER	6.1	6.1	6.1	6.1
		2.1	2.2	2.3		-		6.2	6.2	6.2	6.2
2.2		2.3	-	-	6.3	6.3		6.3	6.3		
2.3		-	-	-	6.4	6.4		6.4	6.4		
-		-	-	2.4	6.5	6.5		6.5	6.5		
-		-	2.4	2.5	6.6	6.6		6.6	6.6		
-		2.4	2.5	2.6	6.7	6.7		6.7	6.7		
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2.5		2.6	-	-	6.9	6.9		6.9	6.9		
2.6		-	-	-	RENEWABLE SOURCES OF ENERGY	-		-	-	7.1	
2.7	2.7	2.7	2.7	-		-		7.1	7.2		
2.8	2.8	2.8	2.8	-		7.1	7.2	7.3			
2.9	2.9	2.9	2.9	7.1		7.2	7.3	-			
2.10	2.10	2.10	2.10	7.2		7.3	-	-			
2.11	2.11	2.11	2.11	7.3		-	-	-			
PETROLEUM	-	-	-	3.1	7.4	7.4	7.4	7.4			
	-	-	3.1	3.1	7.5	7.5	7.5	7.5			
	-	3.1	3.1	3.1	7.6	7.6	-	-			
	3.1	3.1	3.1	-	7.7	7.7	7.6	7.6			
	3.2	3.1	-	-	-	-	-	7.7			
	3.3	-	-	-	ANNEX A CALORIFIC VALUES	A.1	A.1	A.1	A.1		
	-	-	-	3.2		A.2	A.2	A.2	A.2		
	-	-	3.2	3.3		A.3	A.3	A.3	A.3		
	-	3.2	3.3	3.4		-	-	-	-		
	3.4	3.3	3.4	-		-	-	-	-		
	3.5	3.4	-	-		-	-	-	-		
3.6	-	-	-	-		-	-	-			
3.7	3.5	3.5	3.5	-		-	-	-			
3.8	3.6	3.6	3.6	-	-	-	-				
3.9	3.7	-	-	-	-	-	-				
3.10	3.8	3.7	3.7	-	-	-	-				

Chapter 1

Energy

Introduction

1.1 This chapter presents figures on overall energy production and consumption. Figures showing the flow of energy from production, transformation and energy industry use through to final consumption are presented in the format of an energy balance based on the individual commodity balances presented in Chapters 2 to 5 and 7.

1.2 The chapter begins with aggregate energy balances covering the last three years (Tables 1.1 to 1.3) starting with the latest year, 2008. Energy value balances then follow this for the same years (Tables 1.4 to 1.6) and Table 1.7 shows sales of electricity and gas by sector in value terms. Table 1.8 covers final energy consumption by the main industrial sectors over the last five years, followed by Table 1.9, which shows the fuels used for electricity generation by these industrial sectors. The explanation of the principles behind the energy balance and commodity balance presentations, and how this links with the figures presented in other chapters, is set out in Annex A. Information on long term trends (Tables 1.1.1 to 1.1.8) for production, consumption, and expenditure on energy, as well as long term temperature data and analyses such as the relationship between energy consumption and the economy of the UK are available on DECC's energy statistics web site at:

www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

Calorific values when producing energy statistics

1.3 A consultation was launched in the 2005 edition of the Digest seeking views of users as to whether Net Calorific Values (NCVs) should be used in place of Gross Calorific Values (GCVs). In conclusion DECC recognised that there are good arguments both for and against moving from GCV to NCV. However, it was concluded that there was no demonstrable advantage to changing the method of presenting UK Energy statistics, and so GCVs continue to be used in the main DUKES publication. The fuel specific NCVs are shown at Annex A. However, as the new EU renewables target is calculated on data converted using net calorific values, aggregate energy balances for the most recent years have been calculated using NCVs and are available on the internet version, Annex I, of this publication at: www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

The energy industries

1.4 The energy industries in the UK play a central role in the economy by producing, transforming and supplying energy in its various forms to all sectors. They are also major contributors to the UK's Balance of Payments through the exports of crude oil and oil products. The box below summarises the energy industries' contribution to the economy in 2008:

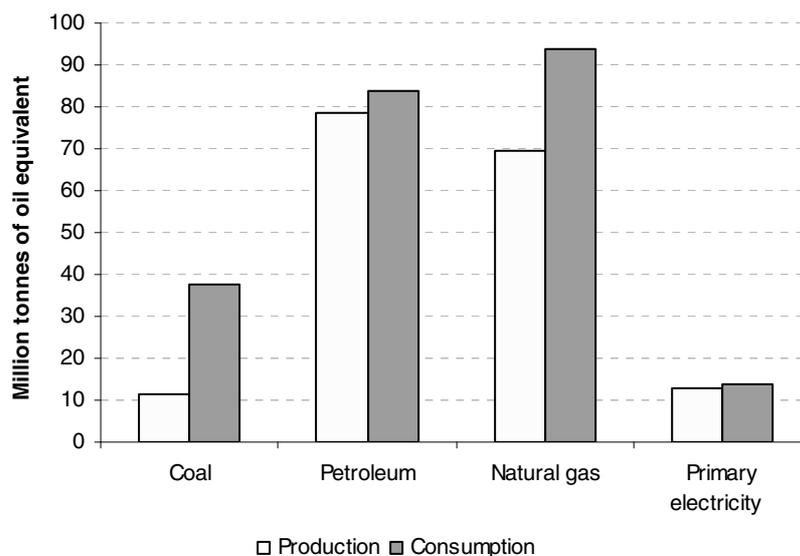
- 4.8 per cent of GDP;
- 7.1 per cent of total investment;
- 41.0 per cent of industrial investment;
- 157,700 people directly employed (5 per cent of industrial employment);
- Many others indirectly employed (eg an estimated 230,000 in support of UK Continental Shelf activities).

Aggregate energy balance (Tables 1.1, 1.2 and 1.3)

1.5 These tables show the flows of energy in the United Kingdom from production to final consumption through conversion into secondary fuels such as coke, petroleum products, secondary electricity and heat sold. The figures are presented on an energy supplied basis, in tonnes of oil equivalent.

1.6 In 2008, the primary supply of fuels was 234.2 million tonnes of oil equivalent, a 1.2 per cent decrease compared to 2007. Indigenous production in 2008 was 4.9 per cent lower than in 2007, with output falling in each year since 1999. Chart 1.1 illustrates the figures for the production and consumption of individual primary fuels in 2008. In 2008, aggregate primary fuel consumption was not met by indigenous production; this continues the trend since 2004 when the UK became a net importer of fuel. However, as explained in subsequent chapters, the UK has traded fuels such as oil and gas regardless of whether it has been a net exporter or importer. In 2008 the UK imported more coal, manufactured fuels, crude oil, electricity and gas than it exported; however, we remained a net exporter of petroleum products.

Chart 1.1: Production and consumption of primary fuels 2008



Note: Includes non-energy use of petroleum and gas. Differences between consumption and production are made up by foreign trade, marine bunkers and stock changes.

1.7 Total primary energy demand was 1.1 per cent lower in 2008 than in 2007 at 234.3 million tonnes of oil equivalent. The very small difference between demand and supply is classed as the statistical difference, which is explained in paragraph 1.60. Demand has declined in each of the last three years. Chart 1.2 shows the composition of primary demand in 2008.

1.8 The transfers row in Tables 1.1 to 1.3 should ideally sum to zero with transfers from primary oils to petroleum products amounting to a net figure of zero. Similarly the manufactured gases and natural gas transfers should sum to zero. However differences in calorific values between the transferred fuels can result in non-zero values.

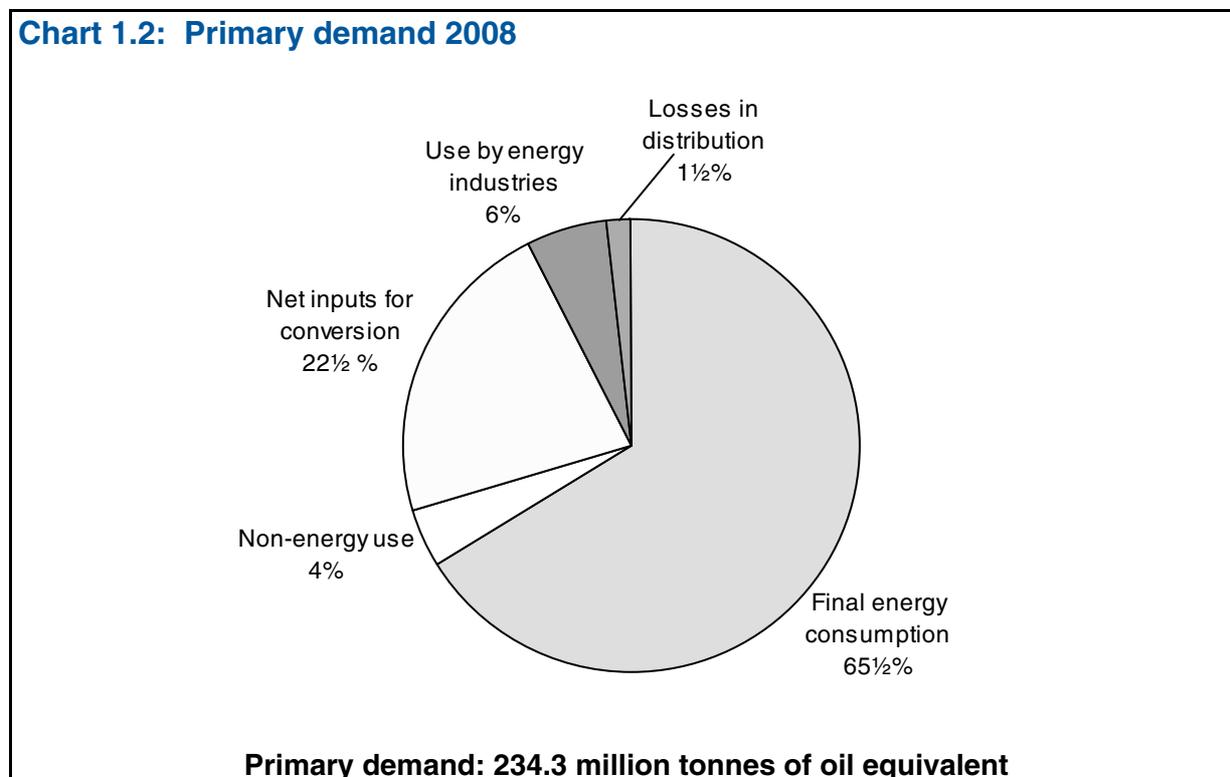
1.9 The transformation section of the energy balance shows, for each fuel, the net inputs for transformation uses. For example, Table 1.1 shows that 4,280 thousand tonnes of oil equivalent of coal feeds into the production of 4,062 thousand tonnes of oil equivalent of coke, representing a loss of 218 thousand tonnes of oil equivalent in the manufacture of coke in 2008. In 2008, energy losses during the production of electricity and other secondary fuels amounted to just under 52 million tonnes of oil equivalent, shown in the transformation row in Table 1.1.

1.10 In 2008, coal prices rose at a faster rate than gas prices. As a result a number of electricity generators switched some production from using coal to gas fired stations. Generation from coal-fired stations was 8.2 per cent lower in 2008 than in 2007, with generation from gas in 2008 at a record level, 6.6 per cent higher than in 2007. Generation from nuclear sources fell by 17 per cent as the nuclear sector was affected by a high level of outages for repairs and maintenance.

1.11 This switch from coal to gas fired electricity generation contributed to the fall in carbon dioxide emissions between 2007 and 2008. More details of carbon dioxide emissions are available in Annex E to the Digest, which is available on the DECC website at:

www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

Chart 1.2: Primary demand 2008



1.12 The energy industry use section of the table represents use of fuels by the energy industries themselves. This section also includes consumption by those parts of the iron and steel industry which behave like an energy industry i.e. they are involved in the transformation processes (see paragraph A.29 of Annex A). In 2008, energy industry use amounted to 13.9 million tonnes of oil equivalent of energy, a decrease of 4.0 per cent on 2007. The main reason for the decline was reduced production combined with an increase in efficiency driven by a rise in costs.

1.13 Losses presented in the energy balance include distribution and transmission losses in the supply of manufactured gases, natural gas, and electricity. Recorded losses increased by 6.7 per cent between 2007 and 2008. Losses in North Sea gas production are no longer separately identified in the simplified Petroleum Product Reporting System, which was introduced in January 2001. This has improved the quality of production data and reduced reported losses. Further details can be found in paragraph 4.26 in Chapter 4.

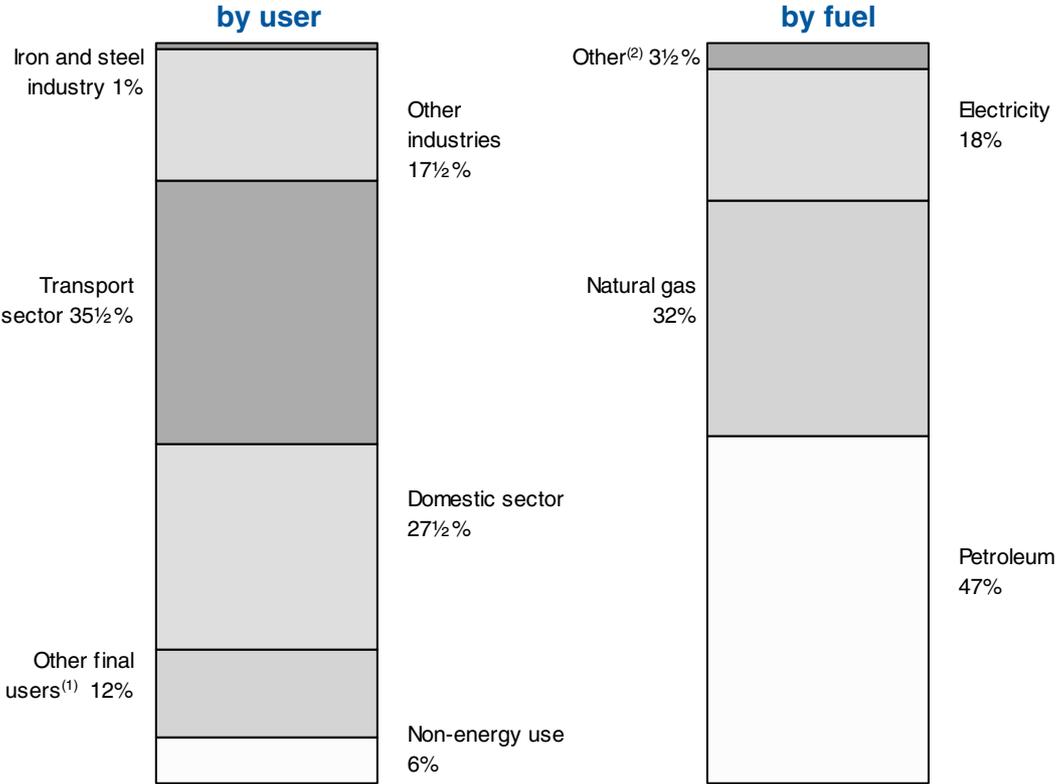
1.14 Total final consumption, which includes non-energy use of fuels, in 2008 was 164.9 million tonnes of oil equivalent; this is a 0.9 million tonnes of oil equivalent reduction on the consumption in 2007. Final energy consumption in 2008 was mainly accounted for by the transport sector (36 per cent), the domestic sector (28 per cent), the industrial sector (19 per cent), the commercial sector (6 per cent) and non-energy use (6 per cent). These figures are illustrated in Chart 1.3. Recent trends in industrial consumption are shown in Table 1.8 and are discussed in paragraphs 1.22 to 1.24. This year liquid biofuels, used predominantly for road transport, have been included in the renewables and waste column in the main volume balance tables. Further details are contained in the renewables and petroleum chapters.

1.15 The main fuels used by final consumers in 2008 were petroleum products (47 per cent), natural gas (32 per cent) and electricity (18 per cent). Of the petroleum products consumed by final users 12 per cent was for non-energy purposes; for natural gas 1.5 per cent was consumed for non-energy

purposes. The amount of heat that was bought for final consumption accounted for 0.7 per cent of the total final energy consumption.

1.16 Non-energy use of fuels includes use as chemical feedstocks and other uses such as lubricants. Non-energy use of fuels for 2008 are shown in Table 1A. Further details of non-energy use are given in Chapter 3, paragraphs 3.57 to 3.64 and Chapter 4, paragraphs 4.40.

Chart 1.3: Final energy consumption 2008



Total: 164.9 million tonnes of oil equivalent

(1) Includes services and agricultural sectors.
 (2) Includes coal, manufactured fuels, biomass etc.

Table 1A: Non-energy use of fuels 2008

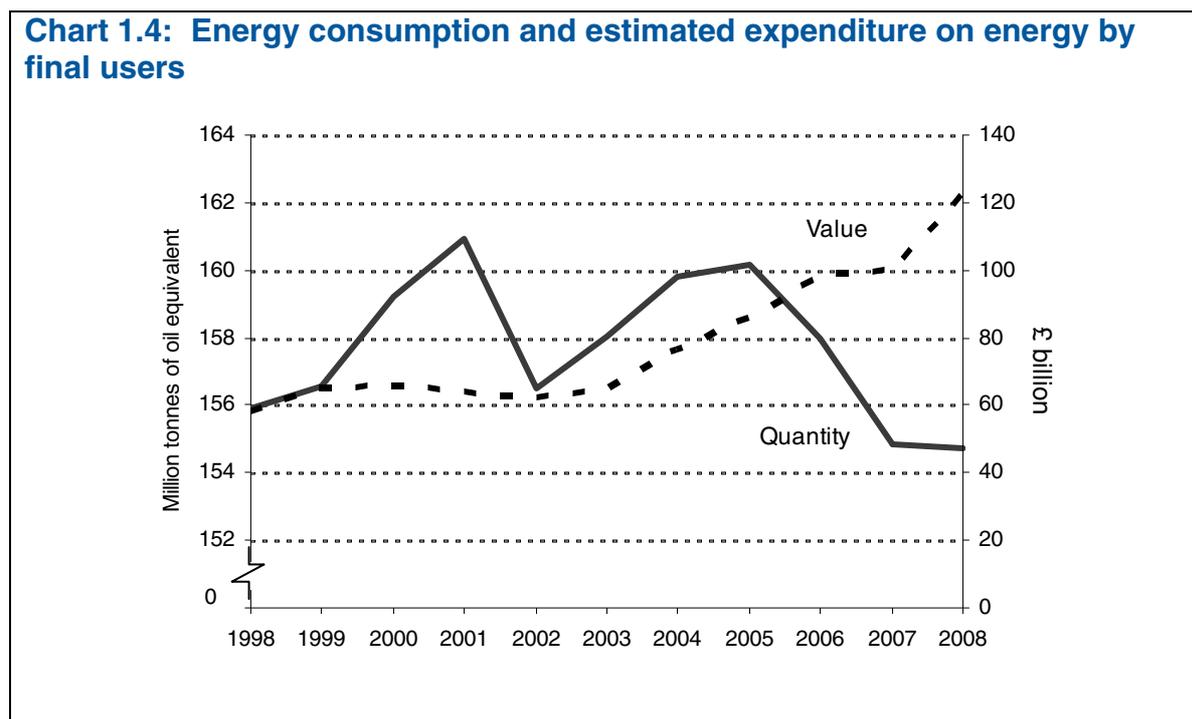
	Thousand tonnes of oil equivalent	
	Petroleum	Natural gas
Petrochemical feedstocks	5,369	797
Other	3,915	-
Total	9,284	797

Value balance of traded energy (Tables 1.4, 1.5 and 1.6)

1.17 Tables 1.4 to 1.6 present the value of traded energy in a similar format to the energy balances. The balance shows how the value of inland energy supply is made up from the value of indigenous production, trade, tax and margins (profit and distribution costs). The lower half of the table shows how this value is generated from the final expenditure on energy through transformation processes and other energy sector users as well as from the industrial and domestic sectors. The balances only contain values of energy which is traded, ie where a transparent market price is applicable. Further technical notes are given in paragraphs 1.26 to 1.59. In keeping with the energy balances, the value

balances since 2000 have included data on heat generation and heat sold. Additionally, an estimate of the amount of Climate Change Levy paid is included in Tables 1.4, 1.5 and 1.6. This levy was introduced in April 2001 and is payable by non-domestic final consumers of gas, electricity, coal, coke and LPG.

1.18 Total expenditure by final consumers in 2008 is estimated at £122,910 million, (£122,170 million shown as actual final consumption and £740 million of coal consumed by the iron and steel sector in producing coke for their own consumption). This is up by 23 per cent on 2007, reflecting the large rises in energy prices. In 2008, crude oil prices spiked, reaching over \$140 per barrel, with subsequent rises in the costs of other energy products. Chart 1.4 below shows energy consumption and expenditure by final users.



1.19 The value balance provides a guide on how the value chain works in the production and consumption of energy. For example, in 2008, £26,630 million of crude oil was indigenously produced, of which £17,070 million was exported, and £21,720 million of crude oil was imported. Allowing for stock changes, this provides a total value of UK inland crude oil supply of £31,385 million. This fuel was then completely consumed within the petroleum industry in the process of producing £39,870 million of petroleum products. Again some external trade and stock changes took place before arriving at a basic value of petroleum products of £37,575 million. In supplying the fuel to final consumers distribution costs were incurred and some profit was made amounting to £3,565 million, whilst duty and tax meant a further £33,605 million was added to the basic price to arrive at the final market value of £74,740 million. This was the value of petroleum products purchased, of which industry purchased £3,105 million, domestic consumers for heating purposes purchased £1,695 million, with the vast majority purchased within the transportation sectors, £65,980 million.

1.20 Of the total final expenditure on energy in 2008 (£122,910 million), the biggest share, 55 per cent, fell to the transport sector. Of the remaining 45 per cent, industry purchased around a quarter or £14,800 million, with the domestic sector purchasing over a half or £28,335 million.

Sales of electricity and gas by sector (Table 1.7)

1.21 Table 1.7 shows broad estimates for the total value of electricity and gas to final consumption. Net selling values provide some indication of typical prices paid in broad sectors and can be of use to supplement more detailed and accurate information contained in the rest of this chapter.

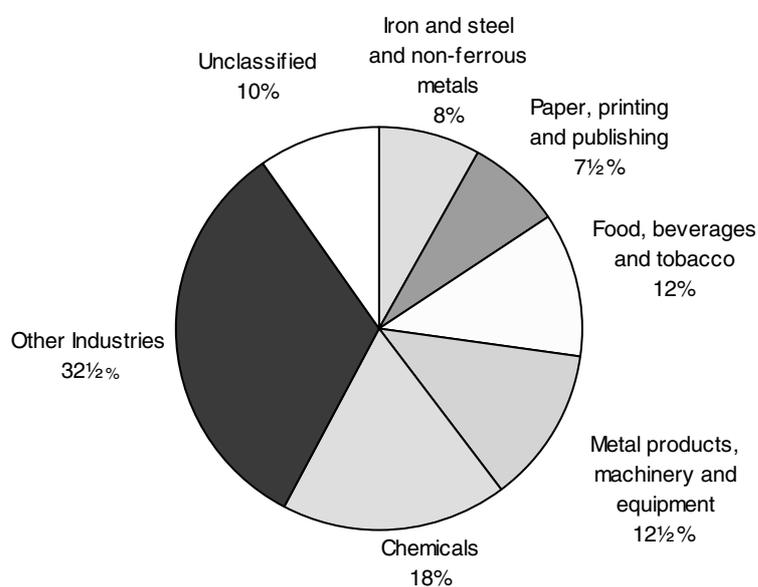
Energy consumption by main industrial groups (Table 1.8)

1.22 This table presents final energy consumption for the main industrial sub-sectors over the last five years.

1.23 So far as is practicable, the user categories have been grouped on the basis of the 2003 Standard Industrial Classification (see paragraphs 1.54 to 1.58). However, some data suppliers have difficulty in classifying consumers to this level of detail and the breakdown presented in these tables must therefore be treated with caution. The groupings used are consistent with those used in Table 1.9 which shows industrial sectors' use of fuels for generation of electricity (autogeneration).

1.24 In 2008, 30.5 million tonnes of oil equivalent were consumed by the main industrial groups. The largest consuming groups were chemicals (17.9 per cent), metal products, machinery and equipment (12.6 per cent), food, beverages and tobacco (11.8 per cent), iron and steel and non-ferrous metals (8.1 per cent), and paper, printing and publishing (7.3 per cent). The figures are illustrated in Chart 1.5.

Chart 1.5: Energy consumption by main industrial groups 2008



**Total final energy consumption by industry
30.5 million tonnes of oil equivalent**

Fuels consumed for electricity generation by main industrial groups (autogeneration) (Table 1.9)

1.25 This table gives details of the amount of each fuel consumed by industries in order to generate electricity for their own use. Fuel consumption is consistent with the figures given for “other generators” in Table 5.4 of Chapter 5. The term autogeneration is explained further in paragraphs 1.31 and 1.32. Electricity produced via autogeneration is included within the figures for electricity consumed by industrial sectors in Table 1.8. Table 1.9 has been produced using the information currently available and shows the same sector detail as Table 1.8, data cannot be given in as much detail as in the individual commodity balances and the energy balance because it could disclose information about individual companies. Table 1.9 allows users to allocate the fuel used for autogeneration to individual industry groups in place of the electricity consumed. Further information on the way Table 1.9 links with the other tables is given in paragraph 1.32.

Technical notes and definitions

I Units and measurement of energy

Units of measurement

1.26 The original units of measurement appropriate to each fuel are used in the individual fuel chapters. A common unit of measurement, the tonne of oil equivalent (toe), which enables different fuels to be compared and aggregated, is used in Chapter 1. In common with the International Energy Agency and with the Statistical Office of the European Communities, the tonne of oil equivalent is defined as follows:

1 tonne of oil equivalent	= 10 ⁷ kilocalories
	= 396.83 therms
	= 41.868 Gigajoules (GJ)
	= 11,630 Kilowatt hours (kWh)

1.27 This unit should be regarded as a measure of energy content rather than a physical quantity. One tonne of oil is not equal to one tonne of oil equivalent.

Thermal content - energy supplied basis of measurement

1.28 Tables 1.1 to 1.3, 1.8 and 1.1.1 to 1.1.5 (available on DECC's energy statistics site at www.decc.gov.uk/en/content/cms/statistics/source/total/total.aspx) are compiled on an energy-supplied basis. Detailed data for individual fuels are converted from original units to tonnes of oil equivalent using gross calorific values and conversion factors appropriate to each category of fuel. The results are then aggregated according to the categories used in the tables. Gross calorific values represent the total energy content of the fuel, including the energy needed to evaporate the water present in the fuel (see also paragraph 1.52).

1.29 Estimated gross and net calorific values for 2008 are given on page 223. Calorific values are reviewed each year in collaboration with the fuel industries, and figures for earlier years can be found in Table A.2 and A.3 on pages 224 and 225. This year, a number of revisions have been made to the net calorific values for certain petroleum products. To construct energy balances on an energy supplied basis calorific values are required for production, trade, and stocks, as follows:

Coal The weighted average gross calorific value of all indigenous coal consumed is used to derive the thermal content of coal production and undistributed stocks. Thermal contents of imports and exports allow for the quality of coal. Thermal contents of changes in coal stocks at secondary fuel producers are the average calorific values of indigenous coal consumed.

Petroleum Work carried out in 1997 to revise calorific values for petroleum products did not find any recent work on the subject. In the absence of such work, the gross calorific values, included in Annex A, and used in the construction of these energy balances from 1990 onwards have been calculated using a formula derived by the US Bureau of Standards. This formula estimates the gross calorific value of products according to their density as follows:

$Gj = 51.83 - 8.78 \times d^2$, where d is the density of the product in terms of kilograms per litre.

For crude petroleum and refinery losses, the weighted average calorific value for all petroleum products from UK refineries is used. A notional figure of 42.9 GJ per tonne is used for non-energy petroleum products (industrial and white spirits, lubricants, bitumen, petroleum coke, waxes and miscellaneous products).

Gases Although the original unit for gases is the cubic metre, figures for gases are generally presented in the fuel sections of this Digest in gigawatt hours (GWh), having been converted from cubic metres using gross calorific values provided by the industries concerned. Conversion factors between units of energy are given on the flap inside the back cover and on page 223.

Electricity and heat Unlike other fuels, the original unit used to measure electricity and heat is a measure of energy. The figures for electricity and heat can therefore be converted directly to toe using the conversion factors on the flap inside the back cover and on page 223.

Primary electricity Hydro electricity and net imports of electricity are presented in terms of the energy content of the electricity produced (the energy supplied basis). This is consistent with international practice. Primary inputs for nuclear electricity assume the thermal efficiencies at nuclear stations given in Chapter 5, Table 5.10 (37.9 per cent in 2008). (See Chapter 5, paragraphs 5.27 and 5.66.)

Non-energy uses of fuel

1.30 Energy use of fuel mainly comprises use for lighting, heating, motive power and power for appliances. Non-energy use includes use as chemical feedstocks, solvents, lubricants and road making material. It should be noted that the amounts of non-energy use of natural gas included in the Digest are approximate. Further discussion of non-energy uses of lubricating oils and petroleum coke appears in Chapter 3, paragraphs 3.57 to 3.64.

Autogeneration of electricity

1.31 Autogeneration is defined as the generation of electricity by companies whose main business is not electricity generation, the electricity being produced mainly for that company's own use. Estimated amounts of fuel used for thermal generation of electricity by such companies, the output of electricity and the thermal losses incurred in generation are included within the Transformation sector in the energy balances shown in Tables 1.1 to 1.3. Electricity used in the power generation process by autogenerators is shown within the Energy Industry Use section. Electricity consumed by industry and commerce from its own generation is included as part of Final consumption. This treatment is in line with the practice in international energy statistics.

1.32 Figures on total amount of fuel used and electricity generated by autogenerators, and the amount of electricity for own consumption is shown in Tables 1.9, 5.1, 5.3 to 5.6. Table 1.9 summarises the figures by broad industrial groups. Much of the power generated is from combined heat and power (CHP) plants and data from Chapter 6 are included within Table 1.9. Differences will occur where CHP plants are classified to major power producers, and this mainly affects the chemicals sector. The method of allocating fuel used in CHP plants between electricity production and heat production is described in Chapter 6 paragraphs 6.34 to 6.36. This method can give rise to high implied conversion efficiencies in some sectors, most notably in the iron and steel sector.

Final consumption, deliveries, stock changes

1.33 Figures for final consumption relate to deliveries, if fuels can be stored by users and data on actual consumption are not available. Final consumption of petroleum and solid fuels is on a deliveries basis throughout, except for the use of solid fuels by the iron and steel industry. Figures for domestic use of coal are based on deliveries to merchants. Figures for stock changes in Tables 1.1 to 1.3 cover stocks held by primary and secondary fuel producers, major distributors of petroleum products, and stocks of coke and breeze held by the iron and steel industry; for coal they also include an estimate of volumes in transit. Figures for stock changes in natural gas represent the net amount put into storage by gas companies operating pipelines.

1.34 Figures for final consumption of electricity include sales by the public distribution system and consumption of electricity produced by generators other than the major electricity producing companies. Thus electricity consumption includes that produced by industry and figures for deliveries of other fuels to industry exclude amounts used to generate electricity (except for years prior to 1987, shown in tables giving long term trends).

Heat sold

1.35 Heat sold is defined as heat that is produced and sold under the provision of a contract. The heat sold figures have been derived from two sources covering CHP plants and community heating schemes without CHP plants. Data for heat sold were supplied by CHP plants to the Combined Heat and Power Quality Assurance Programme and were processed by AEA. Data for heat consumption from community heating schemes were derived from the Building Research Establishment's (BRE) 'Nationwide Survey of Community Heating' that was carried out in 1997, a database of community heating schemes in social housing in 2000, and Community Heating Sales Surveys undertaken

between 2003 and 2005. The estimates from these sources have been used to derive heat sold figures since 1999. When information about where the heat was generated was not available from the BRE sources, it was assumed that domestic sector heat consumption was provided by the commercial sector, public sector heat consumption was provided by the public administration and industrial sectors (using proportions derived from CHP statistics) and that industrial sector heat consumption was provided by the industrial sector. The introduction of heat sold into the energy balances has not affected the individual fuel totals, since the energy used to generate the heat has been deducted from the final consumption section of the energy balance and transferred to the transformation section. The figures that are included in the balances should be treated as indicative of the amount of heat sold. Annex J of the Digest, at www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx, shows the quantity of fuel by consuming sector used to produce heat that is subsequently sold.

II Energy balances (Tables 1.1, 1.2 and 1.3)

1.36 Tables 1.1, 1.2 and 1.3 show the energy flows as the primary fuels are processed (or used) and as the consequent secondary fuels are used. The net inputs to transformation are shown in the transformation rows and hence outputs from transformation processes into which primary fuels are input (such as electricity generation, heat generation or petroleum refining) appear as positive figures under the secondary product's heading in the tables. Similarly the net inputs are shown as negative figures under the primary fuel headings.

III Value balances (Tables 1.4, 1.5 and 1.6)

Valuation of energy purchases

1.37 In common with the rest of the chapter, these tables covering energy expenditure follow a balance format. While a user may derive data on a similar basis as that previously published, the balance table allows for more varied use and interpretation of traded energy value data. That said, the table continues to only show values for energy that has to be purchased and therefore does not include estimated values of a sector's internal consumption, such as coal used in the process of coal extraction.

The value balance

1.38 The table balances around **market value of inland consumption**, with the lower half of the table showing the total value of consumption by end users, sub divided into energy sector users and final users both for energy and non-energy use. The top half of the table shows the supply components that go to make up the final market value of inland consumption, namely upstream cost of production, imports, taxes and the margins and costs of delivering and packaging the fuel for the final consumer. The total final consumers' value of energy consumption is represented by the lines 'total non energy sector use' and iron and steel sectors purchases of coal for use in solid fuel manufacture.

1.39 All figures are estimates and have been rounded to the nearest £5 million.

Fuel definitions in value balances

1.40 **Crude oil** includes NGLs (Natural Gas Liquids) and refinery feedstocks. **Natural gas** does not include colliery methane. **Electricity** only includes electricity delivered via the public distribution system and therefore does not value electricity produced and consumed by autogenerators, however the fuels used by autogenerators are included under Transformation. **Manufactured solid fuels** includes coke, breeze and other solid manufactured fuels, mainly products from patent fuel and carbonisation plants. **Other fuels** includes all other fuels not separately listed, where they can be clearly considered as traded and some reasonable valuation can be made. Fuels mainly contributing to this year's values are wood, coke oven and colliery methane gases sold on to other industrial users and some use of waste products such as poultry litter.

Energy end use

1.41 Values represent the cost to the final user including transportation of the fuel. They are derived, except where actual values are available, from the traded element of the volumes presented in aggregate energy balance and end user prices collected from information supplied by users or energy

suppliers. The **energy sector** consists of those industries engaged in the production and sale of energy products, but values are not given for consumption of self-generated fuels eg coke oven gas used by coke producers. Many of the processes in the **iron and steel** industry are considered to be part of the energy sector in the energy balances, but for the purposes of this economic balance their genuine purchases are treated as those of final consumers, except for purchases of coal directly used in coke manufacture, which is shown separately as part of manufacture of solid fuel. Coal used directly in or to heat blast furnaces is shown as iron and steel final use. **Transformation** includes those fuels used directly in producing other fuels eg crude oil in petroleum products. **Electricity generators** keep and use significant stocks of coal, and the stocks used in consumption each year are shown separately. The value and margins for these being assumed to be the same as other coal purchased in the year. **Road transport** includes all motor spirit and DERV use. **Commercial and other users** includes public administration and miscellaneous uses not classified to the industrial sector.

Supply

1.42 The supply side money chain is derived using various methods. **Indigenous production** represents the estimated basic value of in-year sales by the upstream producers. This value is gross of any taxes or cost they must meet. The valuation problems in attributing network losses in gas and electricity between upstream and downstream within this value chain means any costs borne are included in the production value. **Imports and exports** are valued in accordance with data published by HM Revenue and Customs, contained in Annex G (which can be found on the Internet at www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx). However, crude oil is treated differently, where the value is formed from price data taken from a census survey of refiners and volume data taken from Table 3.1. These values are considered to reflect the complete money chain more accurately than Tables G.1 to G.4. **Stock changes** are those for undistributed stocks except for coal where coke oven and generators stocks are included. A stock increase takes money out of the money chain and is therefore represented as a negative. **Distribution costs** are arrived at by removing an estimate of producers' value along with any taxes from the end user values shown. For most fuels, the estimate of producer value is derived from the consumption used for end use and the producer price taken from survey of producers. No sector breakdown is given for gas and electricity margins because it is not possible to accurately measure delivery costs for each sector. **Taxes** include VAT where not refundable and duties paid on downstream sales. Excluded are the gas and fossil fuel levies, petroleum revenue tax and production royalties and licence fees. The proceeds from the fossil fuel levy are redistributed across the electricity industry, whilst the rest are treated as part of the production costs.

Sales of electricity and gas by sector (Table 1.7)

1.43 This table provides data on the total value of gas and electricity sold to final consumers. The data are collected from the energy supply companies. The data are useful in indicating relative total expenditure between sectors, but the quality of data provided in terms of industrial classification has been worsening in recent years. Net selling values provide an indication of typical prices paid in broad sectors.

IV Measurement of energy consumption

Primary fuel input basis

1.44 Energy consumption is usually measured in one of three different ways. The first, known as the primary fuel input basis, assesses the total input of primary fuels and their equivalents. This measure includes energy used or lost in the conversion of primary fuels to secondary fuels (for example in power stations and oil refineries), energy lost in the distribution of fuels (for example in transmission lines) and energy conversion losses by final users. Primary demands as in Table 1.1, 1.2 and 1.3 are on this basis.

Final consumption - energy supplied basis

1.45 The second method, known as the energy supplied basis, measures the energy content of the fuels, both primary and secondary, supplied to final users. Thus it is net of fuel industry own use and conversion, transmission and distribution losses, but it includes conversion losses by final users. Table 1B presents shares of final consumption on this basis. The final consumption figures are presented on this basis throughout Chapter 1.

1.46 Although this is the usual and most direct way to measure final energy consumption, it is also possible to present final consumption on a primary fuel input basis. This can be done by allocating the conversion losses, distribution losses and energy industry use to final users. This approach can be used to compare the total primary fuel use which each sector of the economy accounts for. Table 1C presents shares of final consumption on this basis.

Final consumption - useful energy basis

1.47 Thirdly, final consumption may be expressed in the form of useful energy available after deduction of the losses incurred when final users convert energy supplied into space or process heat, motive power or light. Such losses depend on the type and quality of fuel and the equipment used and on the purpose, conditions, duration and intensity of use. Statistics on useful energy are not sufficiently reliable to be given in this Digest; there is a lack of data on utilisation efficiencies and on the purposes for which fuels are used.

Shares of each fuel in energy supply and demand

1.48 The relative importance of the energy consumption of each sector of the economy depends on the method used to measure consumption. Shares of final consumption on an energy supplied basis (that is in terms of the primary and secondary fuels directly consumed) in 2008 are presented in Table 1B. For comparison, Table 1C presents shares of final consumption on a primary fuel input basis.

Table 1B: Primary and secondary fuels consumed by final users in 2008 – energy supplied basis

	Percentage of each fuel						Percentage of each fuel					
	Industry	Transport	Domestic	Others	Total		Solid fuels	Petroleum	Gas	Secondary electricity	Bio-mass	Total
Solid fuels	72	-	27	0	100	Industry	7	21	38	33	1	100
Petroleum	9	84	4	2	100	Transport	-	97	-	1	1	100
Gas	22	-	60	18	100	Domestic	2	7	69	22	1	100
Electricity	33	2	35	30	100	Others	-	7	47	45	1	100
Biomass	19	46	24	10	100							
All fuels	19	38	30	13	100	All users	2	44	34	19	1	100

Table 1C: Total primary fuel consumption by final users in 2008 - primary input basis

	Percentage of each fuel						Percentage of each sector					
	Industry	Transport	Domestic	Others	Total		Coal	Petroleum	Gas	Primary electricity	Bio-mass	Total
Coal	37	2	34	27	100	Industry	26	14	46	11	3	100
Petroleum	10	83	5	2	100	Transport	1	96	1	1	1	100
Gas	26	1	50	22	100	Domestic	18	5	66	8	2	100
Primary electricity	33	2	35	30	100	Others	26	5	53	13	3	100
Biomass	28	17	31	23	100							
All fuels	23	29	31	17	100	All users	16	33	41	7	2	100

1.49 In 2008, every 1 toe of secondary electricity consumed by final users required, on average, 0.9 toe of coal, 1.0 toe of natural gas, 0.4 toe of primary electricity (nuclear, natural flow hydro and imports) and 0.1 toe of oil and renewables combined. The extent of this primary consumption is hidden in Table 1B, which presents final consumption only in terms of the fuels directly consumed. When all such primary consumption is allocated to final users, as in Table 1C, the relative importance of fuels and sectors changes; the transport sector, which uses very little electricity, declines in importance, whilst the true cost of final consumption in terms of coal use can now be seen.

1.50 Another view comes from shares of users' expenditure on each fuel (Table 1D based on Table 1.4). In this case the importance of fuels which require most handling by the user (solids and liquid fuels) is slightly understated, and the importance of uses taxed at higher rates (transport) is overstated in the "All users" line.

Table 1D: Value of fuels purchased by final users in 2008

							Percentage of each
	Solid fuels	Petroleum	Gas	Secondary electricity	Heat	Biofuels	sector Total
Industry	3	21	19	56	1	-	100
Transport	-	97	-	1	-	2	100
Domestic	1	6	44	49	-	-	100
Others	-	7	23	70	1	-	100
All users	1	59	14	25	0	1	100

Systems of measurement - international statistics

1.51 The systems of energy measurement used in various international statistics differ from the methods of the Digest as follows:

Net calorific values

1.52 Calorific values (thermal contents) used internationally are net rather than gross. The difference between the net and gross thermal content is the amount of energy necessary to evaporate the water present in the fuel or formed during the combustion process. The differences between gross and net values are generally taken to be 5 per cent for liquid and solid fuels (except for coke and coke breeze where there is no difference), 10 per cent for gases (except for blast furnace gas, 1 per cent), 15 per cent for straw, and 16 per cent for poultry litter. The calorific value of wood is highly dependent on its moisture content. In Annex A, the gross calorific value is given as 10 GJ per tonne at 50 per cent moisture content and this rises to 14.5 GJ at 25 per cent moisture content and 19 GJ for dry wood (equivalent to a net calorific value). Both gross and net calorific values are shown in Annex A. DECC and the Iron and Steel Statistics Bureau are currently reviewing the relationship between net and gross calorific values for fuels used by the Iron and Steel industry.

V Definitions of fuels

1.53 The following paragraphs explain what is covered under the terms "primary" and "secondary" fuels.

Primary fuels

Coal - Production comprises all grades of coal, including slurry.

Primary oils - This includes crude oil, natural gas liquids (NGLs) and feedstock.

Natural gas liquids - Natural gas liquids (NGLs) consist of condensates (C₅ or heavier) and petroleum gases other than methane C₁, that is ethane C₂, propane C₃ and butane C₄, obtained from the onshore processing of associated and non-associated gas. These are treated as primary fuels when looking at primary supply but in the consumption data presented in this chapter these fuels are treated as secondary fuels, being transferred from the primary oils column in Tables 1.1, 1.2 and 1.3.

Natural gas - Production relates to associated or non-associated methane C₁ from land and the United Kingdom sector of the Continental Shelf. It includes that used for drilling production and pumping operations, but excludes gas flared or re-injected. It also includes colliery methane piped to the surface and consumed by collieries or others.

Nuclear electricity - Electricity generated by nuclear power stations belonging to the major power producers. See Chapter 5, paragraphs 5.57 and 5.60.

Natural flow hydro-electricity - Electricity generated by natural flow hydroelectric power stations, whether they belong to major power producers or other generators. Pumped storage stations are not included (see under secondary electricity below).

Renewable energy sources - In this chapter figures are presented for renewables and waste in total. Further details, including a detailed breakdown of the commodities and technologies covered are in Chapter 7.

Secondary fuels

Manufactured fuel - This heading includes manufactured solid fuels such as coke and breeze, other manufactured solid fuels, liquids such as benzole and tars and gases such as coke oven gas and blast furnace gas. Further details are given in Chapter 2, Tables 2.4, 2.5 and 2.6.

Coke and breeze – Coke, oven coke and hard coke breeze. Further details are given in Chapter 2, Tables 2.4, 2.5 and 2.6.

Other manufactured solid fuels – Manufactured solid fuels produced at low temperature carbonisation plants and other manufactured fuel and briquetting plants. Further details are given in Chapter 2, Tables 2.4, 2.5 and 2.6.

Coke oven gas - Gas produced at coke ovens, excluding low temperature carbonisation plants. Gas bled or burnt to waste is included in production and losses. Further details are given in Chapter 2, Tables 2.4, 2.5 and 2.6.

Blast furnace gas - Blast furnace gas is mainly produced and consumed within the iron and steel industry. Further details are given in Chapter 2, Tables 2.4, 2.5 and 2.6.

Petroleum products - Petroleum products produced mainly at refineries, together with inland deliveries of natural gas liquids.

Secondary electricity - Secondary electricity is that generated by the combustion of another fuel, usually coal, natural gas, biofuels or oil. The figure for outputs from transformation in the electricity column of Tables 1.1, 1.2 and 1.3 is the total of primary and secondary electricity, and the subsequent analysis of consumption is based on this total.

Heat sold – Heat sold is heat that is produced and sold under the provision of a contract.

VI Classification of consumers

1.54 The Digest has been prepared, as far as is practicable, on the basis of the *Standard Industrial Classification (SIC)2003* (www.statistics.gov.uk/about/data/classifications/default.asp). SIC(2003) replaced SIC(1992) on 1 January 2003. SIC(1992) had been the basis of the industrial classification of energy statistics since 1995. Between 1986 and 1994 data in the Digest were prepared on the basis of the previous classification, SIC(1980). The changes in classification between SIC(1992) and SIC(2003) are mainly in the very detailed classifications at the four or five digit level. As such the classifications used for energy statistics are unaffected by these changes. However, not all consumption/disposals data are on this new basis, and where they are, there are sometimes constraints on the detail available. In particular the sectoral breakdown in the petroleum chapter is based on data that continue to be classified according to SIC (1968) by the oil industry. The main differences between the 1968 SIC (which was used as the basis for most data published for years prior to 1984) and the 1980 SIC were described in the 1986 and 1987 issues of the Digest. The differences between SIC 1980 and SIC 1992 are relatively minor. At the time of the change from the 1980 SIC to the 1992 SIC the main difference was that under the former showrooms belonging to the fuel supply industries were classified to the energy sector, whilst in the latter they are in the commercial sector. Since privatisation few gas, coal and electricity companies have retained showrooms and the difference is therefore minimal.

1.55 Table 1E shows the categories of consumers together with their codes in SIC 2003. The coverage varies between tables (eg in some instances the 'other' category is split into major constituents, whereas elsewhere it may include transport). This is because the coverage is dictated by what data suppliers can provide. The table also shows the disaggregation available within industry. This disaggregation forms the basis of virtually all the tables that show a disaggregated industrial breakdown.

Table 1E: SIC 2003 classifications

Fuel producers	10-12, 23, 40
Final consumers:	
Industrial	
Unclassified	See paragraph 1.56 below
Iron and steel	27, <i>excluding 27.4, 27.53, 27.54</i>
Non-ferrous metals	27.4, 27.53, 27.54
Mineral products	14, 26
Chemicals	24
Mechanical engineering and metal products	28, 29
Electrical and instrument engineering	30-33
Vehicles	34, 35
Food, beverages & tobacco	15, 16
Textiles, clothing, leather, & footwear	17-19
Paper, printing & publishing	21, 22
Other industries	13, 20, 25, 36, 37, 41
Construction	45
Transport, storage and communications	60-63
Other final users	
Domestic	Not covered by SIC 2003.
Public administration	75, 80, 85
Commercial	50-52, 55, 64-67, 70-74
Agriculture	01, 02, 05
Miscellaneous	90-93, 99

1.56 There is also an 'unclassified' category in the industry sector (see Table 1E). In cases where the data supplier has been unable to allocate an amount between categories, but the Department of Energy and Climate Change has additional information, from other data sources, with which to allocate between categories, then this has been done. Where such additional information is not available the data are included in the 'unclassified' category, enabling the reader to decide whether to accept a residual, pro-rate, or otherwise adjust the figures. The 'miscellaneous' category also contains some unallocated figures for the services sector.

1.57 In Tables 6.8 and 6.9 of Chapter 6 the following abbreviated grouping of industries, based on SIC 2003, is used in order to prevent disclosure of information about individual companies.

Table 1F: Abbreviated grouping of Industry

Iron and steel and non-ferrous metal	27
Chemicals	24
Oil refineries	23.2
Paper, printing and publishing	21, 22
Food, beverages and tobacco	15, 16
Metal products, machinery and equipment	28, 29, 30, 31, 32, 34, 35
Mineral products, extraction, mining and agglomeration of solid fuels	10, 11, 14, 26
Sewage Treatment	(parts of 41 and 90)
Electricity supply	40.1
Other industrial branches	12, 13, 17, 18, 19, 20, 23.1, 23.3, 25, 33, 36, 37, 40.2, 41 (remainder) 45
Transport, commerce, and administration	1, 2, 5, 50 to 99 (except 90 and 92)
Other	40.3, 90 (remainder), 92

1.58 In Tables 1.8 and 1.9 the list above is further condensed and includes only manufacturing industry and construction as follows.

Table 1G: Abbreviated grouping of Industry for Tables 1.8 and 1.9

Iron and steel and non-ferrous metals	27
Chemicals	24
Paper, printing and publishing	21, 22
Food, beverages and tobacco	15, 16
Metal products, machinery and equipment	28, 29, 30, 31, 32, 34, 35
Other (including construction)	12, 13, 14, 17, 18, 19, 20, 23.1, 23.3, 25, 26, 33, 36, 37, 45

VII Monthly and quarterly data

1.59 Monthly and quarterly data on energy production and consumption (including on a seasonally adjusted and temperature corrected basis) split by fuel type are provided on the DECC website at www.decc.gov.uk/en/content/cms/statistics/source/total/total.aspx. Quarterly figures are also published in DECC's quarterly statistical bulletin *Energy Trends* and *Quarterly Energy Prices*. See Annex C for more information about these bulletins.

VIII Statistical differences

1.60 Tables 1.1 to 1.3 each contain a statistical difference term covering the difference between recorded supply and recorded demand. These statistical differences arise for a number of reasons. The data within each table are taken from varied sources, as described above and in later chapters, for example producers, intermediate consumers (such as electricity generators), final consumers and HM Revenue and Customs. Also, some of the figures are estimated either because data in the required detail are not readily available within the industry or because the methods of collecting the data do not cover the smallest members of the industry.

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1.1 Aggregate energy balance 2008

Thousand tonnes of oil equivalent

	Coal	Manufactured fuel(1)	Primary oils	Petroleum products	Natural gas(2)	Renewable & waste(3)	Primary electricity	Electricity	Heat	Total
Supply										
Indigenous production	11,362	-	78,580	-	69,672	4,361	12,965	-	-	176,939
Imports	28,418	500	65,612	26,071	35,000	948	-	1,057	-	157,606
Exports	-457	-142	-52,993	-31,332	-10,548	-	-	-109	-	-95,581
Marine bunkers	-	-	-	-2,733	-	-	-	-	-	-2,733
Stock change(4)	-2,152	156	256	12	-265	-	-	-	-	-1,993
Primary supply	37,170	514	91,454	-7,981	93,859	5,309	12,965	948	-	234,238
Statistical difference(5)	-161	-10	-133	-63	+75	-	-	+91	-	-201
Primary demand	37,331	524	91,587	-7,918	93,784	5,309	12,965	857	-	234,439
Transfers	-	-126	-3,489	+3,495	-6	-	-1,056	+1,056	-	-125
Transformation	-35,551	1,669	-88,098	86,568	-34,157	-3,537	-11,909	32,096	1,281	-51,639
Electricity generation	-29,911	-858	-	-989	-32,165	-3,537	-11,909	32,096	-	-47,274
Major power producers	-28,988	-	-	-387	-29,326	-750	-11,909	29,374	-	-41,986
Autogenerators	-922	-858	-	-603	-2,840	-2,787	-	2,723	-	-5,288
Heat generation	-285	-51	-	-60	-1,992	-	-	-	1,281	-1,108
Petroleum refineries	-	-	-88,098	87,834	-	-	-	-	-	-264
Coke manufacture	-4,280	4,062	-	-	-	-	-	-	-	-218
Blast furnaces	-852	-1,718	-	-217	-	-	-	-	-	-2,787
Patent fuel manufacture	-223	235	-	-	-	-	-	-	-	12
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	4	850	-	4,777	5,950	-	-	2,282	72	13,934
Electricity generation	-	-	-	-	-	-	-	1,403	-	1,403
Oil and gas extraction	-	-	-	-	5,270	-	-	51	-	5,322
Petroleum refineries	-	-	-	4,777	162	-	-	438	72	5,449
Coal extraction	4	-	-	-	8	-	-	84	-	96
Coke manufacture	-	429	-	-	-	-	-	7	-	436
Blast furnaces	-	420	-	-	62	-	-	39	-	521
Patent fuel manufacture	-	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	110	-	110
Other	-	-	-	-	447	-	-	149	-	597
Losses	-	236	-	-	1,172	-	-	2,358	-	3,766
Final consumption	1,776	982	-	77,367	52,499	1,772	-	29,369	1,209	164,974
Industry	1,247	743	-	6,360	11,393	336	-	9,764	773	30,616
Unclassified	-	237	-	2,426	3	336	-	-	-	3,001
Iron and steel	1	507	-	12	586	-	-	419	-	1,524
Non-ferrous metals	20	-	-	47	284	-	-	609	-	959
Mineral products	759	-	-	173	954	-	-	667	-	2,553
Chemicals	92	-	-	176	3,093	-	-	1,818	361	5,540
Mechanical engineering etc	10	-	-	98	665	-	-	712	3	1,488
Electrical engineering etc	4	-	-	47	335	-	-	600	-	986
Vehicles	34	-	-	116	742	-	-	481	-	1,373
Food, beverages etc	28	-	-	282	2,228	-	-	1,051	2	3,591
Textiles, leather etc	53	-	-	104	525	-	-	274	-	956
Paper, printing etc	104	-	-	65	918	-	-	1,137	1	2,226
Other industries	141	-	-	2,656	838	-	-	1,867	406	5,908
Construction	-	-	-	159	222	-	-	129	-	510
Transport (6)	-	-	-	57,268	-	821	-	725	-	58,814
Air	-	-	-	13,426	-	-	-	-	-	13,426
Rail	-	-	-	747	-	-	-	725	-	1,472
Road	-	-	-	41,331	-	821	-	-	-	42,152
National navigation	-	-	-	1,764	-	-	-	-	-	1,764
Pipelines	-	-	-	-	-	-	-	-	-	-
Other	529	239	-	4,454	40,308	615	-	18,880	437	65,461
Domestic	515	239	-	3,033	31,239	430	-	10,132	52	45,642
Public administration	5	-	-	472	4,066	99	-	1,901	375	6,919
Commercial	4	-	-	402	3,264	11	-	6,496	10	10,187
Agriculture	3	-	-	305	186	74	-	350	-	918
Miscellaneous	-	-	-	243	1,553	-	-	-	-	1,797
Non energy use	-	-	-	9,284	797	-	-	-	-	10,081

(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.

(2) Includes colliery methane.

(3) Includes geothermal and solar heat.

(4) Stock fall (+), stock rise (-).

(5) Primary supply minus primary demand.

(6) See paragraphs 5.11 regarding electricity use in transport and 7.25 regarding renewables use in transport.

1.2 Aggregate energy balance 2007

Thousand tonnes of oil equivalent

	Coal	Manufactured fuel(1)	Primary oils	Petroleum products	Natural gas(2)	Renewable & waste(3)	Primary electricity	Electricity	Heat	Total
Supply										
Indigenous production	10,696r	-	83,912r	-	72,125	4,357r	14,928	-	-	186,017r
Imports	28,197r	733r	62,611r	27,501r	29,065	378	-	741	-	149,225r
Exports	-419r	-170r	-55,754	-32,710r	-10,590	-34r	-	-292	-	-99,969r
Marine bunkers	-	-	-	-2,513	-	-	-	-	-	-2,513
Stock change(4)	1,862r	-22	856	1,090r	471	-	-	-	-	4,258r
Primary supply	40,337r	541r	91,625	-6,632r	91,071	4,701r	14,928	448	-	237,019r
Statistical difference(5)	+37r	-13r	-117	-79r	+81r	-	-	+85r	-	-7r
Primary demand	40,300r	554r	91,741	-6,552r	90,990r	4,701r	14,928	364r	-	237,026r
Transfers	-	-126	-3,211	+3,235r	-7	-	-892	+892	-	-110
Transformation	-38,555r	1,725	-88,530	87,862r	-32,214r	-3,481r	-14,036	32,916r	1,196r	-53,118r
Electricity generation	-32,873r	-937	-	-677	-30,330r	-3,481r	-14,036	32,916r	-	-49,419r
Major power producers	-31,975r	-	-	-211	-27,502r	-625r	-14,036	30,081r	-	-44,268r
Autogenerators	-898r	-937	-	-466	-2,828r	-2,856r	-	2,835r	-	-5,150r
Heat generation	-286	-51	-	-60	-1,884r	-	-	-	1,196r	-1,086r
Petroleum refineries	-	-	-88,530	88,808r	-	-	-	-	-	279r
Coke manufacture	-4,319	4,169r	-	-	-	-	-	-	-	-150r
Blast furnaces	-904	-1,633	-	-210	-	-	-	-	-	-2,747
Patent fuel manufacture	-172	176	-	-	-	-	-	-	-	5
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	4	881r	-	4,719r	6,299r	-	-	2,544r	68r	14,514r
Electricity generation	-	-	-	-	-	-	-	1,522r	-	1,522r
Oil and gas extraction	-	-	-	-	5,523	-	-	48	-	5,571
Petroleum refineries	-	-	-	4,719	210r	-	-	576r	68r	5,572r
Coal extraction	4	-	-	-	8	-	-	85	-	96
Coke manufacture	-	424	-	-	-	-	-	8	-	432r
Blast furnaces	-	458	-	-	62	-	-	41	-	561
Patent fuel manufacture	-	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	104	-	104
Other	-	-	-	-	497	-	-	160r	-	657r
Losses	-	216	-	-	1,038	-	-	2,276r	-	3,530r
Final consumption	1,741r	1,054r	-	79,825r	51,433r	1,220r	-	29,352r	1,128r	165,754r
Industry	1,240r	861	-	6,827	11,630r	276r	-	10,061r	690r	31,586r
Unclassified	-	237	-	2,640	3	276r	-	-	-	3,157r
Iron and steel	1	624	-	20	629r	-	-	423	-	1,697r
Non-ferrous metals	22	-	-	48	292	-	-	630r	-	992r
Mineral products	759r	-	-	197	964	-	-	676r	-	2,597r
Chemicals	91	-	-	192	3,161r	-	-	1,909r	277r	5,631r
Mechanical engineering etc	7	-	-	107	672r	-	-	732r	-r	1,519r
Electrical engineering etc	4	-	-	36	339r	-	-	627r	-	1,005r
Vehicles	35	-	-	123	760r	-	-	493r	-	1,410r
Food, beverages etc	29r	-	-	268	2,250r	-	-	1,056r	2r	3,605r
Textiles, leather etc	52	-	-	119	549	-	-	288	-	1,008
Paper, printing etc	101	-	-	65	930r	-	-	1,148r	1	2,246r
Other industries	139r	-	-	2,843	850r	-	-	1,940r	411	6,182r
Construction	-	-	-	169	231	-	-	137	-	537
Transport (6)	-	-	-	59,071r	-	362r	-	696r	-	60,129r
Air	-	-	-	13,906r	-	-	-	-	-	13,906r
Rail	-	-	-	700	-	-	-	696r	-	1,397r
Road	-	-	-	42,846r	-	362r	-	-	-	43,208r
National navigation	-	-	-	1,618	-	-	-	-	-	1,618
Pipelines	-	-	-	-	-	-	-	-	-	-
Other	501	193r	-	4,377	38,923r	582r	-	18,595r	438r	63,609r
Domestic	487	193r	-	2,877	30,348r	400r	-	9,893	52	44,248r
Public administration	6r	-	-	487	3,825r	89r	-	1,921r	376	6,705r
Commercial	4	-	-	409	3,091	19r	-	6,426r	9	9,958r
Agriculture	3	-	-	294	172	74	-	355r	-	897r
Miscellaneous	1	-	-	310	1,488r	-r	-	-	-	1,800r
Non energy use	-	-	-	9,550r	879r	-	-	-	-	10,429r

(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.

(2) Includes colliery methane.

(3) Includes geothermal and solar heat.

(4) Stock fall (+), stock rise (-).

(5) Primary supply minus primary demand.

(6) See paragraphs 5.11 regarding electricity use in transport and 7.25 regarding renewables use in transport.

1.3 Aggregate energy balance 2006

	Thousand tonnes of oil equivalent									
	Coal	Manufactured fuel(1)	Primary oils	Petroleum products	Natural gas(2)	Renewable & waste(3)	Primary electricity	Electricity	Heat	Total
Supply										
Indigenous production	11,418r	-	83,958	-	80,012	3,955r	17,889	-	-	197,232r
Imports	32,668	695	64,872	29,335	20,983	497	-	884	-	149,933
Exports	-342	-120	-54,875	-31,474	-10,369	-44r	-	-238	-	-97,461r
Marine bunkers	-	-	-	-2,486	-	-	-	-	-	-2,486
Stock change(4)	-807	-153	-391	-917	-553	-	-	-	-	-2,821r
Primary supply	42,937r	422	93,564	-5,543	90,072	4,408r	17,889	646	-	244,397r
Statistical difference(5)	-100	-5r	-127	+66	+176r	-	-	+90r	-	+101r
Primary demand	43,037r	427r	93,691	-5,609	89,897r	4,408r	17,889	556r	-	244,296r
Transfers	-	-110	-2,835	+2,869	-5	-	-759	+759	-	-80
Transformation	-41,458r	1,796	-90,856	89,770	-28,506r	-3,471	-17,130	33,071r	1,305	-55,480r
Electricity generation	-35,848r	-967	-	-692	-26,613r	-3,471	-17,130	33,071r	-	-51,649r
Major power producers	-34,945r	-	-	-277	-23,917r	-731	-17,130	30,412r	-	-46,588r
Autogenerators	-902r	-967	-	-415	-2,696r	-2,739r	-	2,659r	-	-5,060r
Heat generation	-286	-51	-	-60	-1,894	-	-	-	1,305	-987
Petroleum refineries	-	-	-90,856	90,760	-	-	-	-	-	-96
Coke manufacture	-4,315	4,272	-	-	-	-	-	-	-	-44
Blast furnaces	-816	-1,659	-	-238	-	-	-	-	-	-2,713
Patent fuel manufacture	-194	202	-	-	-	-	-	-	-	8
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	3	871	-	4,986	6,813r	-	-	2,425r	60	15,159r
Electricity generation	-	-	-	-	-	-	-	1,591r	-	1,591r
Oil and gas extraction	-	-	-	-	5,955r	-	-	47	-	6,002r
Petroleum refineries	-	-	-	4,986	219r	-	-	401r	60	5,666r
Coal extraction	3	-	-	-	10	-	-	89	-	101
Coke manufacture	-	414	-	-	-r	-	-	8	-	423r
Blast furnaces	-	457	-	-	53	-	-	43	-	552
Patent fuel manufacture	-	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	92	-	92
Other	-	-	-	-	578	-	-	155r	-	732r
Losses	-	177	-	-	1,032r	-	-	2,357r	-	3,566r
Final consumption	1,575r	1,065r	-	82,044	53,540r	938r	-	29,604r	1,245	170,011r
Industry	1,131r	849r	-	7,220	12,531r	213r	-	10,139r	809	32,892r
Unclassified	-	231r	-	3,019	4	213r	-	-	-	3,468r
Iron and steel	1r	618	-	20	723	-	-	504	-	1,865r
Non-ferrous metals	35r	-	-	53	276	-	-	647r	-	1,011r
Mineral products	691	-	-	200	1,101r	-	-	685	-	2,677r
Chemicals	54	-	-	193	3,357r	-	-	1,925r	371	5,900r
Mechanical engineering etc	9	-	-	106	746	-	-	730	2	1,594r
Electrical engineering etc	4	-	-	85	354r	-	-	631r	-	1,074r
Vehicles	37	-	-	124	797	-	-	503	-	1,461
Food, beverages etc	17r	-	-	283	2,389r	-	-	1,059	1	3,748r
Textiles, leather etc	49	-	-	131	571	-	-	291	-	1,042
Paper, printing etc	99	-	-	59	1,076r	-	-	1,153r	22	2,410r
Other industries	133	-	-	2,774	917r	-	-	1,870r	414	6,109r
Construction	-	-	-	174	220	-	-	141	-	535
Transport (6)	-	-	-	59,047	-	188r	-	708r	-	59,942r
Air	-	-	-	13,999	-	-	-	-	-	13,999
Rail	-	-	-	726	-	-	-	708r	-	1,434r
Road	-	-	-	42,509	-	188r	-	-	-	42,697r
National navigation	-	-	-	1,812	-	-	-	-	-	1,812
Pipelines	-	-	-	-	-	-	-	-	-	-
Other	445r	216r	-	4,779	40,329r	536r	-	18,757r	436	65,498r
Domestic	425r	216r	-	3,251	31,457r	358r	-	10,013	52	45,771r
Public administration	10	-	-	489	4,197	85	-	1,908r	376	7,065r
Commercial	4	-	-	393	2,947	19r	-	6,481	8	9,854r
Agriculture	3	-	-	306	173	74	-	355	-	912
Miscellaneous	3	-	-	340	1,554r	-r	-	-	-	1,897r
Non energy use	-	-	-	10,997	680r	-	-	-	-	11,678r

(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.

(2) Includes colliery methane.

(3) Includes geothermal and solar heat.

(4) Stock fall (+), stock rise (-).

(5) Primary supply minus primary demand.

(6) See paragraphs 5.11 regarding electricity use in transport and 7.25 regarding renewables use in transport.

1.4 Value balance of traded energy in 2008⁽¹⁾

	£million								
	Coal	Manufactured solid fuels	Crude oil	Petroleum products	Natural gas	Electricity	Heat sold	Other fuels	Total
Supply									
Indigenous production	900	110	26,630	39,870	9,540	9,740	330	310	87,435
Imports	3,015	165	21,720	13,350	6,290	485	-	300	45,325
Exports	-55	-30	-17,070	-14,720	-1,570	-110	-	-	-33,555
Marine bunkers	-	-	-	-900	-	-	-	-	-900
Stock change	-175	-10	105	-30	-5	-	-	-	-120
Basic value of inland consumption	3,685	235	31,385	37,575	14,260	10,115	330	610	98,190
Tax and margins									
Distribution costs and margins	695	30	-	3,565	9,300	19,715	-	65	33,370
Electricity generation	360	-	-	25	-	-	-	-	385
Solid fuel manufacture	190	-	-	-	-	-	-	-	190
of which iron & steel sector	170	-	-	-	-	-	-	-	170
Iron & steel final use	35	10	-	10	-	-	-	-	55
Other industry	25	10	-	520	-	-	-	-	555
Air transport	-	-	-	120	-	-	-	-	120
Rail and national navigation	-	-	-	30	-	-	-	-	30
Road transport	-	-	-	2,095	-	-	-	65	2,160
Domestic	90	10	-	325	-	-	-	-	430
Agriculture	-	-	-	15	-	-	-	-	15
Commercial and other services	-	-	-	65	-	-	-	-	65
Non energy use	-	-	-	350	195	-	-	-	545
VAT and duties	10	5	-	33,605	590	665	-	740	35,610
Electricity generation	-	-	-	55	-	-	-	-	55
Iron & steel final use	-	-	-	-	-	-	-	-	-
Other industry	-	-	-	400	-	-	-	-	400
Air transport	-	-	-	15	-	-	-	-	15
Rail and national navigation	-	-	-	250	-	-	-	-	250
Road transport	-	-	-	32,655	-	-	-	740	33,395
Domestic	10	5	-	100	590	665	-	-	1,365
Agriculture	-	-	-	20	-	-	-	-	20
Commercial and other services	-	-	-	115	-	-	-	-	115
Climate Change Levy	5	-	-	-	180	540	-	-	730
Total tax and margins	710	30	-	37,170	10,070	20,920	-	805	69,705
Market value of inland consumption	4,395	265	31,385	74,740	24,325	31,035	195	1,415	167,760
Energy end use									
Total energy sector	3,940	-	31,385	320	6,450	360	-	70	42,525
Transformation	3,940	-	31,385	320	6,330	-	-	70	42,045
Electricity generation	3,080	-	-	305	6,295	-	-	70	9,750
of which from stocks	70	-	-	-	-	-	-	-	70
Heat Generation	30	-	-	20	35	-	-	-	85
Petroleum refineries	-	-	31,385	-	-	-	-	-	31,385
Solid fuel manufacture	830	-	-	-	-	-	-	-	830
of which iron & steel sector	740	-	-	-	-	-	-	-	740
Other energy sector use	-	-	-	-	120	360	-	-	480
Oil & gas extraction	-	-	-	-	-	45	-	-	45
Petroleum refineries	-	-	-	-	30	240	-	-	270
Coal extraction	-	-	-	-	-	75	-	-	75
Other energy sector	-	-	-	-	90	-	-	-	90
Total non energy sector use	455	265	-	71,555	17,680	30,675	195	1,345	122,170
Industry	270	165	-	3,105	2,810	8,340	75	30	14,800
Iron & steel final use	155	140	-	75	150	200	-	-	730
Other industry	115	25	-	3,025	2,660	8,140	75	30	14,070
Transport	-	-	-	65,980	-	585	-	1,260	67,825
Air	-	-	-	7,595	-	-	-	-	7,595
Rail and national navigation	-	-	-	1,255	-	585	-	-	1,840
Road	-	-	-	57,130	-	-	-	1,260	58,390
Other final users	185	100	-	2,470	14,870	21,750	120	50	39,545
Domestic	185	100	-	1,695	12,345	13,940	15	50	28,335
Agriculture	-	-	-	145	65	415	-	-	625
Commercial and other services	-	-	-	630	2,460	7,395	105	-	10,585
Total value of energy end use	4,395	265	31,385	71,875	24,130	31,035	195	1,415	164,695
Value of non energy end use	-	-	-	2,865	195	-	-	-	3,065
Market value of inland consumption	4,395	265	31,385	74,740	24,325	31,035	195	1,415	167,760

(1) For further information see paragraphs 1.37 to 1.43.

1.5 Value balance of traded energy in 2007⁽¹⁾

	£million								
	Coal	Manufactured solid fuels	Crude oil	Petroleum products	Natural gas	Electricity	Heat sold	Other fuels	Total
Supply									
Indigenous production	585r	55	20,815r	26,740r	7,785r	8,120r	230	255r	64,585r
Imports	1,960	140	13,290	9,205	2,885	240	-	-	27,720r
Exports	-40	-25r	-12,825r	-9,900	-995	-110	-	-	-23,900r
Marine bunkers	-	-	-	-555	-	-	-	-	-555
Stock change	100	-10	175	315r	5	-	-	-	585r
Basic value of inland consumption	2,605r	160	21,455r	25,805r	9,675r	8,255r	230	255r	68,435r
Tax and margins									
Distribution costs and margins	360r	50	-	3,055r	8,350r	17,005r	-	25r	28,845r
Electricity generation	115r	-	-	5	-	-	-	-	120r
Solid fuel manufacture	110	-	-	-	-	-	-	-	110
of which iron & steel sector	100	-	-	-	-	-	-	-	100
Iron & steel final use	20	35	-	20	-	-	-	-	75
Other industry	10	10	-	415r	-	-	-	-	435r
Air transport	-	-	-	110r	-	-	-	-	110
Rail and national navigation	-	-	-	10r	-	-	-	-	10
Road transport	-	-	-	2,100r	-	-	-	25r	2,125r
Domestic	100	10	-	80r	-	-	-	-	190r
Agriculture	-	-	-	10	-	-	-	-	10
Commercial and other services	-	-	-	35r	-	-	-	-	35r
Non energy use	-	-	-	280r	150r	-	-	-	430r
VAT and duties	10	5	-	31,840r	475r	560r	-	320r	33,200r
Electricity generation	-	-	-	30	-	-	-	-	30
Iron & steel final use	-	-	-	-	-	-	-	-	-
Other industry	-	-	-	350	-	-	-	-	350
Air transport	-	-	-	15	-	-	-	-	15
Rail and national navigation	-	-	-	195	-	-	-	-	195
Road transport	-	-	-	31,060r	-	-	-	315r	31,380r
Domestic	10	5	-	70	475r	560r	-	-	1,115r
Agriculture	-	-	-	15	-	-	-	-	15
Commercial and other services	-	-	-	105	-	-	-	-	105
Climate Change Levy	5	-	-	-	165	515	-	-	685
Total tax and margins	370r	55	-	34,895r	8,990r	18,080r	-	340r	62,730r
Market value of inland consumption	2,970r	215	21,455r	60,700r	18,665r	26,330r	135	595r	131,075r
Energy end use									
Total energy sector	2,630r	-	21,455r	190	4,480r	325	-	50	29,130r
Transformation	2,630r	-	21,455r	190	4,380r	-	-	50	28,705r
Electricity generation	2,130	-	-	175	4,355r	-	-	50	6,710r
of which from stocks	60	-	-	-	-	-	-	-	60
Heat Generation	20	-	-	15	25	-	-	-	60
Petroleum refineries	-	-	21,455r	-	-	-	-	-	21,455r
Solid fuel manufacture	480	-	-	-	-	-	-	-	480
of which iron & steel sector	435	-	-	-	-	-	-	-	435
Other energy sector use	-	-	-	-	100r	325	-	-	425r
Oil & gas extraction	-	-	-	-	-	40	-	-	40
Petroleum refineries	-	-	-	-	30r	220	-	-	250r
Coal extraction	-	-	-	-	-	65	-	-	65
Other energy sector	-	-	-	-	70r	-	-	-	70r
Total non energy sector use	345r	215	-	58,235r	14,035r	26,010r	135	545r	99,250r
Industry	185r	145	-	2,365r	2,000r	6,970r	55	20	11,740r
Iron & steel final use	95	125	-	55	110	125	-	-	515r
Other industry	85r	20	-	2,310r	1,895r	6,845r	55	20	11,225r
Transport	-	-	-	54,170r	-	495r	-	480r	55,140r
Air	-	-	-	4,475r	-	-	-	-	4,475r
Rail and national navigation	-	-	-	790	-	495r	-	-	1,280r
Road	-	-	-	48,905r	-	-	-	480r	49,385r
Other final users	160	70	-	1,700	12,035r	18,545r	80	45r	32,640r
Domestic	160	70	-	1,130	9,950r	11,755r	10	45r	23,120r
Agriculture	-	-	-	105	50	370r	-	-	520r
Commercial and other services	-	-	-	465	2,035	6,425r	70	-	8,995r
Total value of energy end use	2,970r	215	21,455r	58,425r	18,515r	26,330r	135	595r	128,650r
Value of non energy end use	-	-	-	2,275r	150r	-	-	-	2,425r
Market value of inland consumption	2,970r	215	21,455r	60,700r	18,665r	26,330r	135	595r	131,075r

(1) For further information see paragraphs 1.37 to 1.43.

1.6 Value balance of traded energy in 2006⁽¹⁾

	£million								
	Coal	Manufactured solid fuels	Crude oil	Petroleum products	Natural gas	Electricity	Heat sold	Other fuels	Total
Supply									
Indigenous production	545	100	20,180r	26,295	10,300r	7,760r	250	180r	65,610r
Imports	2,135	90	13,600	9,790	2,510	420	-	-	28,545
Exports	-30	-20	-12,510r	-9,625	-1,315	-105	-	-	-23,610r
Marine bunkers	-	-	-	-595	-	-	-	-	-595
Stock change	-45	-	-95	-260	-10	-	-	-	-405
Basic value of inland consumption	2,605	175	21,175r	25,600	11,485r	8,075r	250	180r	69,545r
Tax and margins									
Distribution costs and margins	415	35	-	3,515	6,990r	15,990	-	10r	26,950r
Electricity generation	175	-	-	20	-	-	-	-	195
Solid fuel manufacture	125	-	-	-	-	-	-	-	125
of which iron & steel sector	115	-	-	-	-	-	-	-	115
Iron & steel final use	25	15	-	25	-	-	-	-	65
Other industry	10	5r	-	440	-	-	-	-	460
Air transport	-	-	-	115	-	-	-	-	115
Rail and national navigation	-	-	-	50	-	-	-	-	50
Road transport	-	-	-	2,325	-	-	-	10r	2,340r
Domestic	80	10	-	140	-	-	-	-	230
Agriculture	-	-	-	15	-	-	-	-	15
Commercial and other services	-	-	-	60	-	-	-	-	60
Non energy use	-	-	-	320	145r	-	-	-	465r
VAT and duties	5	5	-	30,190	480	540r	-	165r	31,385r
Electricity generation	-	-	-	30	-	-	-	-	30
Iron & steel final use	-	-	-	-	-	-	-	-	-
Other industry	-	-	-	285	-	-	-	-	285
Air transport	-	-	-	20	-	-	-	-	20
Rail and national navigation	-	-	-	170	-	-	-	-	170
Road transport	-	-	-	29,520	-	-	-	160r	29,685r
Domestic	5	5	-	70	480	540r	-	-	1,105r
Agriculture	-	-	-	10	-	-	-	-	10
Commercial and other services	-	-	-	85	-	-	-	-	85
Climate Change Levy	5	-	-	-	185	525	-	-	720
Total tax and margins	425	35r	-	33,705	7,660r	17,055r	-	175r	59,055r
Market value of inland consumption	3,030	210r	21,175	59,305	19,145r	25,130r	155	355r	128,505r
Energy end use									
Total energy sector	2,725r	-	21,175	190	4,115r	295	-	40	28,535r
Transformation	2,725r	-	21,175	190	3,995r	-	-	40	28,120r
Electricity generation	2,150r	-	-	180	3,965r	-	-	40	6,330r
of which from stocks	35r	-	-	-	-	-	-	-	35r
Heat Generation	15	-	-	15	30	-	-	-	60
Petroleum refineries	-	-	21,175	-	-	-	-	-	21,175
Solid fuel manufacture	555	-	-	-	-	-	-	-	555
of which iron & steel sector	505	-	-	-	-	-	-	-	505
Other energy sector use	-	-	-	-	120r	295	-	-	415r
Oil & gas extraction	-	-	-	-	-	35	-	-	35
Petroleum refineries	-	-	-	-	35r	195	-	-	230r
Coal extraction	-	-	-	-	-	65	-	-	65
Other energy sector	-	-	-	-	85r	-	-	-	85r
Total non energy sector use	310	210r	-	56,555	14,890r	24,835r	155	315r	97,265r
Industry	175	135r	-	2,420	2,635r	6,775	70	30	12,240r
Iron & steel final use	100	120	-	65	155	210	-	-	650
Other industry	75	15r	-	2,355	2,480r	6,565	70	30	11,590r
Transport	-	-	-	52,330	-	460	-	250r	53,040r
Air	-	-	-	4,595	-	-	-	-	4,595
Rail and national navigation	-	-	-	855	-	460	-	-	1,315
Road	-	-	-	46,880	-	-	-	250r	47,125r
Other final users	135	75r	-	1,800	12,255r	17,600r	80	40r	31,985r
Domestic	130r	75r	-	1,225	10,100r	11,340r	10	40r	22,925r
Agriculture	-	-	-	105	45	340	-	-	490
Commercial and other services	-	-	-	470	2,110r	5,920	70	-	8,570
Total value of energy end use	3,030	210r	21,175	56,745	19,005r	25,130r	155	355r	125,800r
Value of non energy end use	-	-	-	2,560	145r	-	-	-	2,705r
Market value of inland consumption	3,030	210r	21,175	59,305	19,145r	25,130r	155	355r	128,505r

(1) For further information see paragraphs 1.37 to 1.43.

1.7 Sales of electricity and gas by sector

United Kingdom

	2004	2005	2006	2007	2008
Total selling value (£ million)⁽¹⁾					
Electricity generation - Gas	2,590	3,333	3,966r	4,353r	6,295
Industrial - Gas	1,492	2,223	2,735r	2,026r	2,921
- Electricity	3,428	5,292	7,071	7,292r	8,700
of which:					
Fuel industries	171	232	296	323	359
Industrial sector	3,257	5,060	6,775	6,969r	8,341
Domestic sector - Gas	7,889	7,822	9,618r	9,477r	11,759
- Electricity	8,688	9,205	10,799r	11,193r	13,278
Other - Gas	1,449	1,797	2,336r	2,256r	2,727
- Electricity	4,354	5,408	6,720	7,287r	8,393
of which:					
Agricultural sector	228	276	340	369r	416
Commercial sector	3,115	3,857	4,776	5,150r	5,956
Transport sector	260	346	459	494r	584
Public lighting	82	106	134	151	169
Public admin. and other services	669	823	1,011	1,124r	1,267
Total, all consumers	29,889	35,080	43,246r	43,883r	54,074
of which gas	13,419	15,176	18,656r	18,111r	23,702
of which electricity	16,470	19,905	24,590r	25,773r	30,372
Average net selling value per kWh sold (pence)⁽¹⁾					
Electricity generation - Gas	0.761	1.015	1.284	1.236	1.685
Industrial - Gas	0.969	1.469	1.877	1.498	2.205
- Electricity	3.320	4.998	6.707	6.895	8.452
of which:					
Fuel industries	3.672	4.791	6.305	6.778	7.564
Industrial sector	3.304	5.008	6.726	6.901	8.495
Domestic sector - Gas	1.658	2.037	2.629	2.685	3.237
- Electricity	7.333	7.880	9.274r	9.729r	11.268
Other - Gas	1.277	1.672	2.264	2.262	2.585
- Electricity	4.149	5.084	6.314	6.856r	7.833
of which:					
Agricultural sector	5.447	6.648	8.224	8.944	10.232
Commercial sector	4.197	5.122	6.336	6.891	7.883
Transport sector	3.546	4.642	6.109	6.567r	7.329
Public lighting	4.140	5.052	6.249	6.797	7.775
Public admin. and other services	3.881	4.737	5.860	6.373	7.291
Average, all consumers	2.251	2.698	3.454r	3.463r	4.151
of which gas	1.337	1.563	2.020r	1.927r	2.431
of which electricity	5.088	6.049	7.490r	7.881r	9.261

(1) Excludes VAT where payable - see paragraph 1.43 for a definition of average net selling value.

1.8 Final energy consumption by main industrial groups⁽¹⁾

	Thousand tonnes of oil equivalent				
	2004	2005	2006	2007	2008
Iron and steel and non-ferrous metals					
Coal	7	24	36	23r	21
Manufactured solid fuels (2)	482	479	434	451	378
Blast furnace gas	32	28	78	59	42
Coke oven gas	67	79	106	114	87
Natural gas	1,110	1,005	998	920r	870
Petroleum	87	68	73	68	59
Electricity	1,112	1,093	1,151r	1,054r	1,027
Total iron and steel and non-ferrous metals	2,898	2,775	2,876r	2,689r	2,484
Chemicals					
Coal	94	84	54	91	92
Natural gas	3,611	3,532	3,357r	3,161r	3,093
Petroleum	203	194	193	192	176
Electricity	1,817	2,074	1,925r	1,909r	1,818
Heat purchased from other sectors (3)	394	392	371	277r	361
Total chemicals	6,118r	6,276	5,900r	5,631r	5,540
Metal products, machinery and equipment					
Coal	70	51	50	45	48
Natural gas	1,977	2,001	1,898r	1,771r	1,742
Petroleum	264	292	315	266	261
Electricity	1,806	1,883	1,864r	1,852r	1,793
Heat purchased from other sectors (3)	2	3	2	-r	3
Total metal products, machinery and equipment	4,119	4,229	4,129r	3,934r	3,847
Food, beverages and tobacco					
Coal	26	19	17r	29r	28
Natural gas	2,428	2,400	2,389r	2,250r	2,228
Petroleum	345	323	283	268	282
Electricity	1,062	1,098	1,059	1,056r	1,051
Heat purchased from other sectors (3)	2	1	1	2r	2
Total food, beverages and tobacco	3,863	3,841	3,748r	3,605r	3,591

(1) Industrial categories used are described in Table 1G. Data excludes energy used to generate heat for all fuels except manufactured solid fuels and electricity.

(2) Includes tars, benzole, coke and breeze and other manufactured solid fuels.

(3) Data equates to heat sold information in the energy balances.

1.8 Final energy consumption by main industrial groups⁽¹⁾ (continued)

	Thousand tonnes of oil equivalent				
	2004	2005	2006	2007	2008
Paper, printing and publishing					
Coal	96	98	99	101	104
Natural gas	1,193	1,177	1,076r	930r	918
Petroleum	59	86	59	65	65
Electricity	1,175	1,180	1,153r	1,148r	1,137
Heat purchased from other sectors (3)	27	31	22	1	1
Total paper, printing and publishing	2,551	2,572	2,410r	2,246r	2,226
Other industries					
Coal	942r	905	874r	950r	954
Natural gas	2,912	2,898	2,808r	2,593r	2,538
Petroleum	3,329	3,599	3,280	3,328	3,092
Electricity	2,989	3,035	2,987r	3,042r	2,937
Heat purchased from other sectors (3)	407	405	414	411	406
Total other industries	10,578r	10,841	10,362r	10,324r	9,927
Unclassified					
Manufactured solid fuels (2)	145	226	231r	237	237
Coke oven gas	-	-	-	-	-
Natural gas	6	5	4	3	3
Petroleum	2,632	2,665	3,019	2,640	2,426
Renewables & waste	265	189	213r	276r	336
Total unclassified	3,048	3,085	3,468r	3,157r	3,001
Total					
Coal	1,235r	1,180	1,131r	1,240r	1,247
Manufactured solid fuels (2)	627	705	665r	688	614
Blast furnace gas	32	28	78	59	42
Coke oven gas	67	79	106	114	87
Natural gas	13,238	13,017	12,531r	11,630r	11,393
Petroleum	6,918	7,227	7,220	6,827	6,360
Renewables & waste	265	189	213r	276r	336
Electricity	9,961	10,363	10,139r	10,061r	9,764
Heat purchased from other sectors (3)	832	831	809	690r	773
Total	33,177r	33,618	32,892r	31,586r	30,616

1.9 Fuels consumed for electricity generation (autogeneration) by main industrial groups⁽¹⁾

Thousand tonnes of oil equivalent
(except where shown otherwise)

	2004	2005	2006	2007	2008
Iron and steel and non-ferrous metals					
Coal	764	767	768	766	801
Blast furnace gas	790	801	780	767r	664
Coke oven gas	107	162	161	169r	168
Natural gas	61	44	39	37r	58
Petroleum	32	19	20	28r	44
Other (including renewables) (2)	64	70r	55	56	54
Total fuel input (3)	1,817	1,863	1,823	1,823r	1,789
Electricity generated by iron & steel and non-ferrous metals (4)	481	488	481	475	484
(in GWh)	5,592	5,670	5,592	5,527	5,629
Electricity consumed by iron and steel and non-ferrous metals from own generation (5)	417	427	404r	407r	387
(in GWh)	4,852	4,969	4,703r	4,733r	4,502
Chemicals					
Coal	113	109	111r	112r	113
Natural gas	884	900	718r	723r	760
Petroleum	14	20	15	14r	11
Other (including renewables) (2)	147	138	147r	81r	83
Total fuel input (3)	1,159	1,167	990r	930	966
Electricity generated by chemicals (4)	737	875	866r	800r	812
(in GWh)	8,572	10,177	10,067r	9,300r	9,443
Electricity consumed by chemicals from own generation (5)	560	768	627r	592r	465
(in GWh)	6,517	8,935	7,289r	6,888r	5,409
Metal products, machinery and equipment					
Coal	-	-	-	-	-
Natural gas	70	57	33r	77r	80
Petroleum	6	6	6	6	6
Other (including renewables) (2)	-	-	-	-	-
Total fuel input (3)	76	63	38r	82r	85
Electricity generated by metal products, machinery and equipment (4)	31	18	16r	36r	40
(in GWh)	364	213	189r	421r	460
Electricity consumed by metal products, machinery and equipment from own generation (5)	30	18	16r	35r	38
(in GWh)	351	205	182r	402r	442
Food, beverages and tobacco					
Coal	12	11	7	5	3
Natural gas	277	351	335r	372r	369
Petroleum	47	9	8	5r	3
Other (including renewables) (2)	-	-	-	-	-
Total fuel input (3)	335	371	351r	381r	376
Electricity generated by food, beverages and tobacco (4)	164	182	170r	184r	183
(in GWh)	1,904	2,115	1,982r	2,144r	2,126
Electricity consumed by food, beverages and tobacco from own generation (5) (6)	145	162	129	23r	130
(in GWh)	1,682	1,886	1,497r	266r	1,512

(1) Industrial categories used are described in Table 1G.

(2) Includes hydro electricity, solid and gaseous renewables and waste.

(3) Total fuels used for generation of electricity. Consistent with figures for fuels used by other generators in Table 5.4.

1.9 Fuels consumed for electricity generation (autogeneration) by main industrial groups⁽¹⁾ (continued)

Thousand tonnes of oil equivalent
(except where shown otherwise)

	2004	2005	2006	2007	2008
Paper, printing and publishing					
Coal	25	25	54	41r	27
Natural gas	887	827	781r	827r	834
Petroleum	7	11	7	2	1
Other (including renewables) (2)	5	7	8	7	5
Total fuel input (3)	925	869	850r	877r	867
Electricity generated by paper, printing and publishing (4)	439	408	378	386r	404
(in GWh)	5,100	4,749	4,395	4,492r	4,695
Electricity consumed by paper, printing and publishing from own generation (5)	314	300	279r	334r	297
(in GWh)	3,652	3,490	3,245r	3,881r	3,450
Other industries					
Coal	-	-	-	-	-
Coke oven gas	24	28	26	24	26
Natural gas	180	84	110r	147r	156
Petroleum	6	5	3r	4r	4
Other (including renewables) (2)	1,446	1,556	1,601r	1,706r	1,745
Total fuel input (3)	1,657	1,673	1,739r	1,881r	1,932
Electricity generated by other industries (4)	139	93	107r	134r	123
(in GWh)	1,614	1,085	1,240r	1,555r	1,425
Electricity consumed by other industries from own generation (5)	83	73	92r	47r	56
(in GWh)	962	851	1,075r	546r	649
Total					
Coal	914	911	940r	923r	944
Blast furnace gas	790	801	780	767r	664
Coke oven gas	131	190	187	194r	195
Natural gas	2,359	2,263	2,016r	2,183r	2,257
Petroleum	111	69	59r	58r	69
Other (including renewables) (2)	1,663	1,770	1,810r	1,850r	1,887
Total fuel input (3)	5,968	6,005	5,791r	5,975r	6,014
Electricity generated (4)	1,990	2,064	2,018r	2,016r	2,045
(in GWh)	23,147	24,009	23,465r	23,441r	23,778
Electricity consumed from own generation (5)	1,549	1,749	1,547r	1,437r	1,373
(in GWh)	18,015	20,335	17,991r	16,714r	15,965

(4) Combined heat and power (CHP) generation (ie electrical output from Table 6.8) plus non-chp generation, so that the total electricity generated is consistent with the "other generators" figures in Table 5.6.

(5) This is the electricity consumed by the industrial sector from its own generation and is consistent with the other generators final users figures used within the electricity balances (Tables 5.1 and 5.2). These figures are less than the total generated because some of the electricity is sold to the public distribution system and other users.

(6) 2007 figure is likely to change. Inconsistencies which occurred during the reclassification of CHP schemes are currently being investigated.

(7) The figures presented here are consistent with other figures presented elsewhere in this publication as detailed at (3), (4), and (5) above but are further disaggregated. Overall totals covering all autogenerators can be derived by adding in figures for transport, services and the fuel industries. These can be summarised as follows:

Fuel input	Thousand tonnes of oil equivalent or equivalent				
	2004	2005	2006	2007	2008
All industry	5,968	6,005	5,791r	5,975r	6,014
Fuel industries	1,203	1,465	1,455r	1,361r	1,425
Transport, Commerce and Administration	303	275	240r	246r	242
Services	920	1,172	1,253r	985r	705
Total fuel input	8,394	8,917	8,739r	8,567r	8,386
Electricity generated	3,057	3,104	3,101r	3,064r	2,955
Electricity consumed	2,066	2,232	2,120r	2,152r	1,942
					GWh
Electricity generated	35,548	36,101	36,060r	35,634r	34,364
Electricity consumed	24,029	25,958	24,659r	25,027r	22,589



Chapter 2

Solid fuels and derived gases

Introduction

2.1 This chapter presents figures on the supply and demand for coal and solid fuels derived from coal, and on the production and consumption of gases derived from the processing of solid fuels. An energy flow chart for 2008, showing the flows of coal from production and imports through to consumption, is included overleaf. This is a way of simplifying the figures that can be found in the commodity balance for coal in Table 2.1. It illustrates the flow of coal from the point at which it becomes available from home production or imports (on the left) to the eventual final use of coal (on the right).

2.2 Balances for coal and manufactured fuels, covering each of the last three years, form the first six tables of this chapter (Tables 2.1 to 2.6). These are followed by a five year table showing the supply and consumption of coal as a time series (Table 2.7). Comparable five year tables bring together data for coke oven coke, coke breeze and manufactured solid fuels (Table 2.8) and coke oven gas, blast furnace gas, benzole and tars (Table 2.9). As in previous years, tables showing deep mines in production (Table 2.10) and opencast sites in production (Table 2.11) complete the chapter. The long term trends commentary and tables on coal production and stocks, and on coal consumption are on the DECC energy statistics web site at:

www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

2.3 Detailed statistics of imports and exports of solid fuels are in Annex G, also available on the DECC energy statistics web site at:

www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

2.4 Figures for actual consumption of coal are available for all fuel and power producers and for final use by the iron and steel industry. The remaining final users consumption figures are based on information on disposals to consumers by producers and on imports. For further details see the technical notes and definitions section which begins at paragraph 2.32 of this chapter.

Commodity balances for coal (Tables 2.1, 2.2 and 2.3)

2.5 These balance tables separately identify the three main types of coal: steam coal, coking coal and anthracite. They show the variation both in the sources of supply and where the various types of coal are mainly used. A full breakdown of coal production figures is not available for disclosure control reasons.

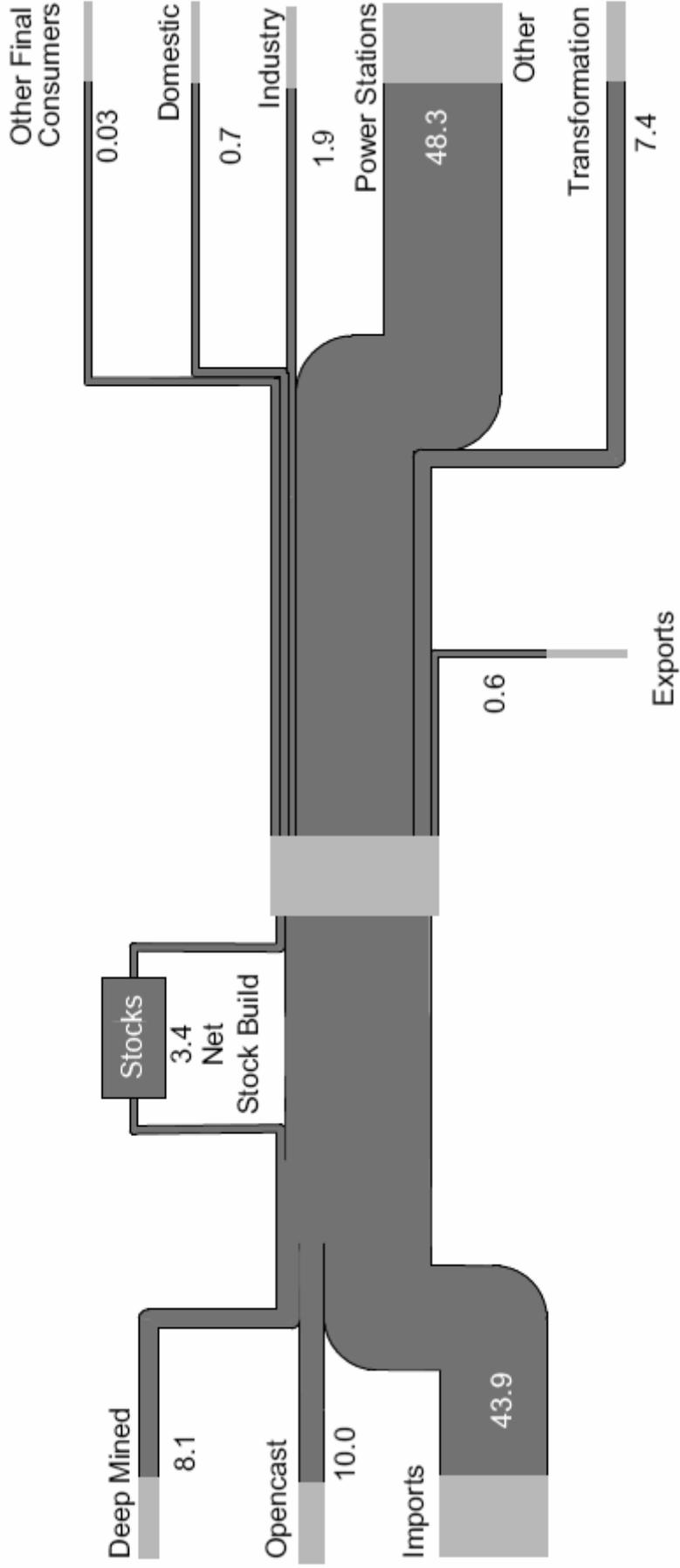
2.6 In 2008, 86 per cent of coal demand was for steam coal, 12 per cent was for coking coal and 2 per cent was for anthracite. Electricity generation accounted for 94 per cent of demand for steam coal and 59 per cent of demand for anthracite. Coking coal was mainly used in coke ovens (83 per cent) but 17 per cent was directly injected into blast furnaces.

2.7 Only 4.4 per cent of the total demand for coal was for final consumption, where it was used for steam raising, space or hot water heating, or heat for processing. Steam coal accounted for 90 per cent of this final consumption. 77 per cent of this was consumed by industry, with mineral products (e.g. cement, glass and bricks) and paper and printing were the largest users. The domestic sector accounted for 26 per cent of the final demand for coal, with 76 per cent of this demand being for steam coal and the remainder for anthracite.

2.8 Chart 2.1, compares the sources of coal supplies in the UK in 2008, along with a breakdown of consumption by user, and serves to illustrate some of the features brought out below.

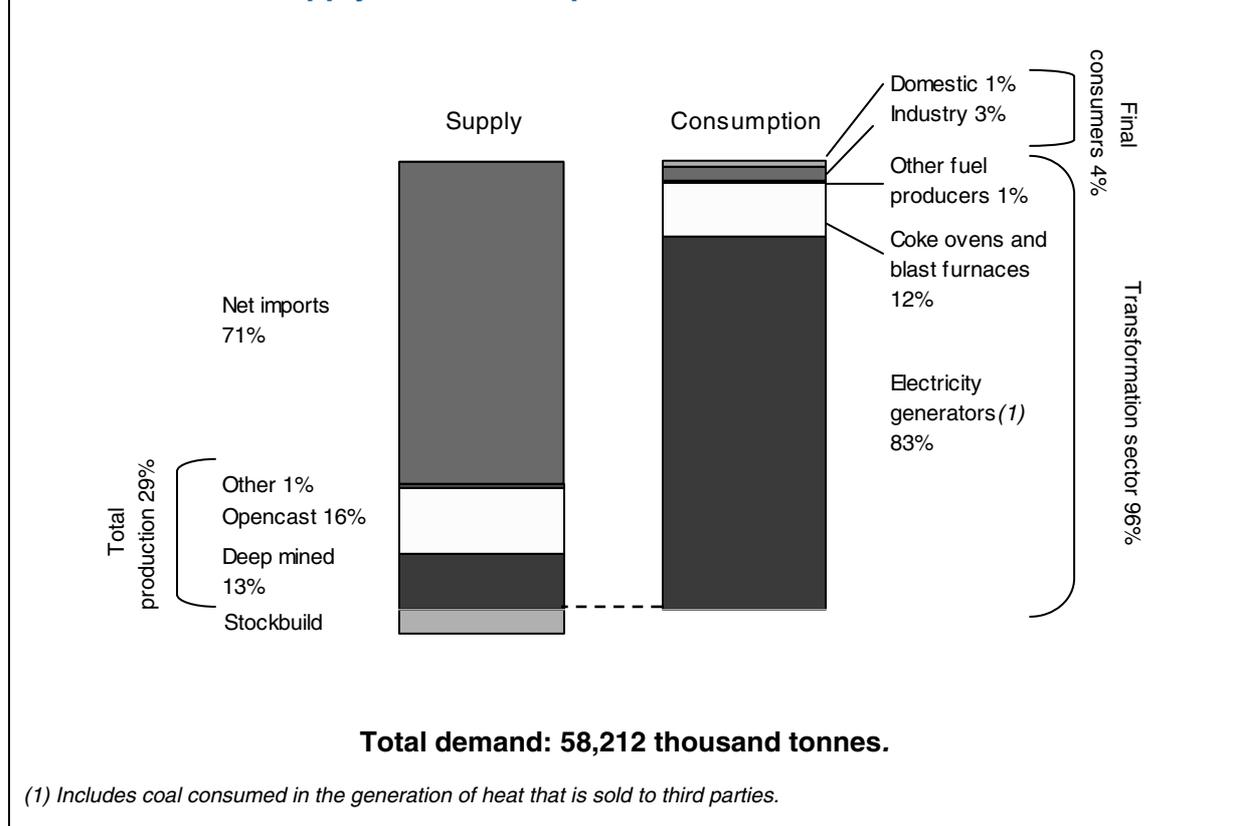
2.9 In 2008, 14 per cent of supply was from deep-mined production, 16 per cent from opencast operations, 75 per cent from net imports and 1 per cent from other sources such as slurry. Between the end of 2007 and the end of 2008, total stock levels rose by 29 per cent.

Coal flow chart 2008 (million tonnes of coal)



Notes:
 This flow chart is based on the data that appear in Tables 2.1 and 2.7.
 Opencast includes slurry and recovered coal.

Chart 2.1: Coal supply and consumption in the UK in 2008



2.10 Recent trends in coal production and consumption are described in paragraphs 2.18 to 2.24.

Commodity balances for manufactured fuels (Table 2.4, 2.5 and 2.6)

2.11 These tables cover fuels manufactured from coal and gases produced when coal is used in coke ovens and blast furnaces. Definitions of terms associated with coke, breeze, other manufactured solid fuels and manufactured gases are set out in paragraphs 2.44 to 2.48.

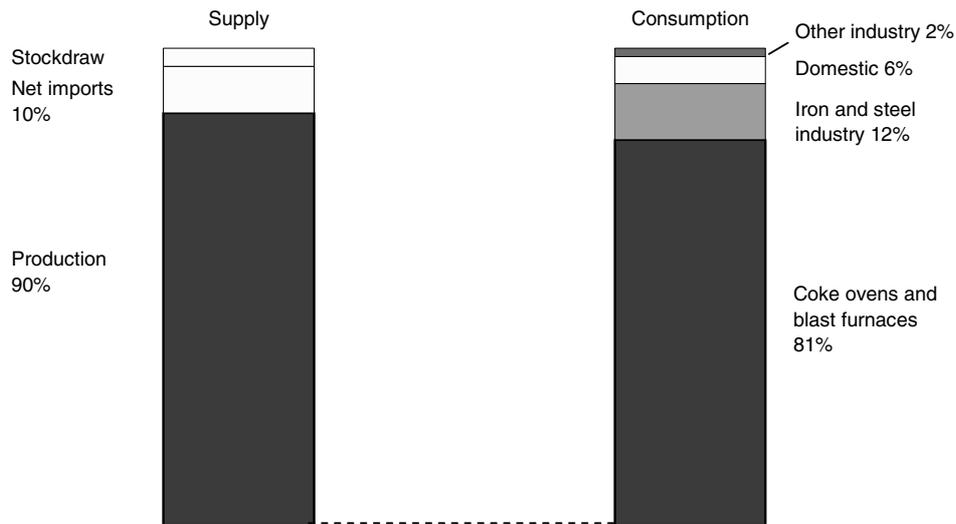
2.12 Around 86 per cent of coke oven coke and coke breeze is home produced with the rest imported. In 2008 the volume of imports was down 32 per cent from 2007. About 4.2 per cent of home production was exported. The coke screened out by producers as breeze and fines amounted to about a fifth of production plus imports in 2008; this appears as transfers in the coke breeze column of the balances. Transfers out of coke oven coke have not always been equal to transfers into coke oven breeze. This was due to differences arising from the timing, location of measurement and the practice adopted by the Iron and Steel works. Since 2000, however, the Iron and Steel Statistics Bureau have been able to reconcile these data. In 2008, 97 per cent of the demand for coke oven coke was at blast furnaces (part of the transformation sector) with most of the remainder going into final consumption.

2.13 Most of the supply of **coke breeze** is from re-screened coke oven coke, with direct production accounting for only 2.9 per cent of total supply. Some breeze is re-used in coke manufacture or in blast furnaces, but the majority is boiler fuel. In 2007, most of the supply of coke breeze was reclassified to coke oven coke following better information received by the Iron and Steel Statistics Bureau.

2.14 **Other manufactured solid fuels** (patent fuels) are manufactured smokeless fuels, produced mainly for the domestic market, as the balances show. A small amount of these fuels (only 5.5 per cent of total supply in 2008) is imported, but exports generally exceed this. Imports and exports of manufactured smokeless fuels can contain small quantities of non-smokeless fuels.

2.15 Chart 2.2 shows the sources of coke, breeze and other manufactured solid fuels, and a breakdown of their consumption.

Chart 2.2: Supply and consumption of coke oven coke, coke breeze and other manufactured solid fuels in 2008

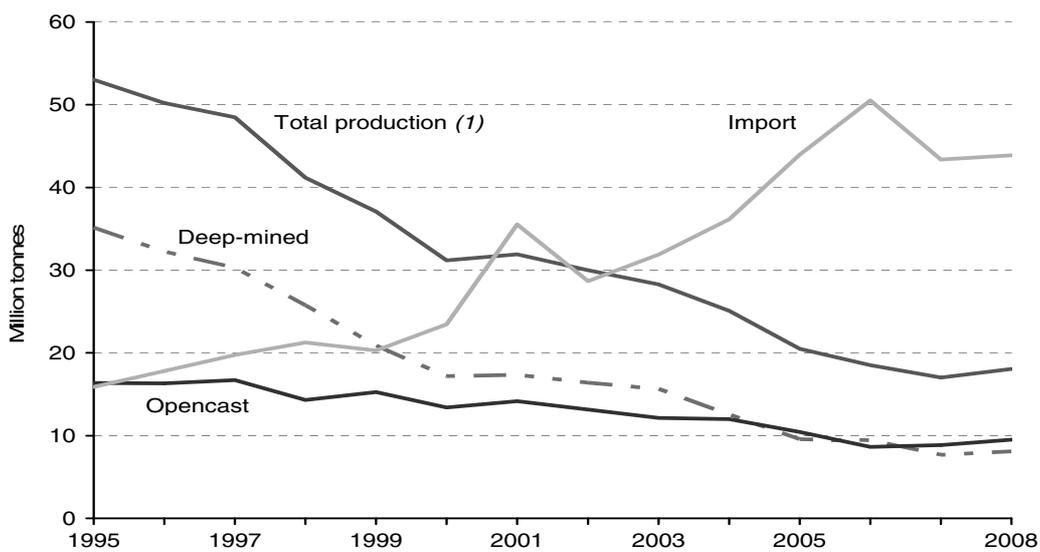


Total demand: 5,398 thousand tonnes.

2.16 The carbonisation and gasification of solid fuels at coke ovens produces **coke oven gas** as a by-product. Some of this (46 per cent in 2008) is used to fuel the coke ovens themselves, while some is used in blast furnaces (8.1 per cent in 2008). Elsewhere, the gas is used for electricity generation (24 per cent), or for heat production, iron and steel and other industrial processes (17 per cent). The remaining 4.4 per cent is lost.

2.17 **Blast furnace gas** is a by-product of iron smelting in a blast furnace. A similar product is obtained when steel is made in basic oxygen steel converters and "BOS" gas is included in this category. Most of these gases are used in other parts of integrated steel works. The generation of electricity in 2008 used 50 per cent of blast furnace gas and BOS gas, while 31 per cent was used in coke ovens and blast furnaces themselves, 1.2 per cent used in general heat production, 15 per cent was lost or burned as waste and a further 3.2 per cent was used in the iron and steel industry.

Chart 2.3: Coal production and imports 1995 to 2008



(1) Includes slurry.

Supply and consumption of coal (Table 2.7)

2.18 **Production** - Figures for 2008 show that coal production (including slurry) rose by 6.2 per cent compared to production in 2007. Deep-mined production rose by 5.5 per cent while opencast production rose by 7.3 per cent. Imports increased by 1 per cent in 2008 to 44 million tonnes led to increase in stocks. Overall demand for coal fell by 7.5 per cent in 2008, driven largely by lower consumption by major power producers. Longer-term trends in production are illustrated in Chart 2.3 above.

2.19 Table 2A shows how production of coal is divided between England, Wales and Scotland on a financial year basis. In 2008/09, 56 per cent of coal output was in England, 34 per cent in Scotland and 10 per cent in Wales. There has been no deep mining of coal in Scotland since Longannet mine closed in 2002.

Table 2A: Output from UK coal mines and employment in UK coal mines ⁽¹⁾⁽²⁾

		Million tonnes			Number		
		Output			Employment		
		April 2006 to March 2007	April 2007 to March 2008	April 2008 to March 2009	end March 2007	end March 2008	end March 2009
Deep-mined	England	7.7	7.3	7.9	3,318	3,348	3,572
	Wales	0.4	0.2	0.1	437	660	347
	Total	8.2	7.5	8.0	3,755	4,008	3,919
Opencast	England	1.0	1.8	2.2	334	425	459
	Scotland	6.1	5.9	6.0	1,021	1,049	1,205
	Wales	1.3	1.1	1.7	301	454	496
	Total	8.4	8.8	9.9	1,656	1,928	2,160
Total	England	8.7	9.1	10.1	3,652	3,773	4,031
	Scotland	6.1	5.9	6.0	1,021	1,049	1,205
	Wales	1.7	1.3	1.8	738	1,114	843
	Total	16.6	16.3	17.9	5,411	5,936	6,079

Source: The Coal Authority

(1) Output is the tonnage declared by operators to the Coal Authority, including estimated tonnages. It excludes estimates of slurry recovered from dumps, ponds, rivers, etc.

(2) Employment includes contractors and is as declared by licensees to the Coal Authority at 31 March each year.

2.20 Table 2A also shows how numbers employed in the production of coal have changed over the last three years. During 2008/09 total employment, including contractors, was 2.4 per cent higher than in 2007/08. At 31 March 2009, 66 per cent of the 6,079 people employed in UK coal mining worked in England, while 20 per cent were employed in Scotland and 14 per cent in Wales.

2.21 **Foreign trade** – Imports of coal and other solid fuel in 2008 increased by less than 1 per cent from 2007 levels to almost 45 million tonnes. In 2008, steam coal accounted for 84 per cent of the total imports, 14 per cent was coking coal, 1.7 per cent were other solid fuels, followed lastly by anthracite, which accounted for 0.3 per cent of total imports. As Table 2B shows, in 2008, Russia accounted for more than 50 per cent (21 million tonnes) of total steam coal imports, with a further 39 per cent (14 million tonnes) from Colombia, South Africa, the USA and Indonesia. The United Kingdom imported 50 per cent (3.2 million tonnes) of coking coal from Australia with a further 45 per cent (2.9 million tonnes) from the USA and Canada. Fifty-three per cent (0.4 million tonnes) of other solid fuels are imported from the European Union and Russia and 36 per cent (0.1 million tonnes) of anthracite imports are from China. Forty-nine per cent (22 million tonnes) of the United Kingdom's total imports comes from Russia and 40 per cent (18 million tonnes) from Colombia, South Africa, the USA and Australia. For more details of imports and exports of solid fuels by country of origin, see Annex G on the DECC energy statistics web site at:

www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

2.22 The proportion of coal consumed by major power producers from imports has continued to rise, from 20 per cent (8.1 million tonnes) in 1999 to a peak of 73.5 per cent (41 million tonnes) in 2006, with the exception of 2002, where the proportion fell to 42 per cent (19 million tonnes). In 2008, 75 per cent (35 million tonnes) of coal consumed by major power producers was from imports.

Table 2B: Imports of coal and other solid fuel in 2008⁽¹⁾

	Thousand tonnes				
	Steam coal	Coking coal	Anthracite	Other solid fuel	Total
Russia	21,193	296	34	186	21,709
Colombia	5,294	-	16	53	5,363
Republic of South Africa	4,249	-	32	-	4,281
United States of America	2,792	1,472	-	-	4,264
Australia	699	3,203	-	-	3,902
Indonesia	2,162	-	-	-	2,162
Canada	-	1,378	-	18	1,396
People's Republic of China	-	-	52	56	108
European Union ⁽²⁾	933	-	11	205	1,149
Other countries	59	-	-	221	280
Total all countries	37,382	6,349	144	738	44,613

Source: H M Revenue and Customs, ISSB

(1) Country of origin basis.

(2) Includes extra-EU coal routed through the Netherlands.

2.23 **Transformation** – The 7.9 per cent decline in total coal consumption between 2007 and 2008 reflected a decrease in coal-fired electricity generation by major power producers of nearly 4.8 million tonnes. This fall was due to increased coal prices relative to gas, making coal-fired generation less competitive. However, in UK steel production, coal use for coke making and for injection into blast furnaces fell by 1.8 per cent in 2008.

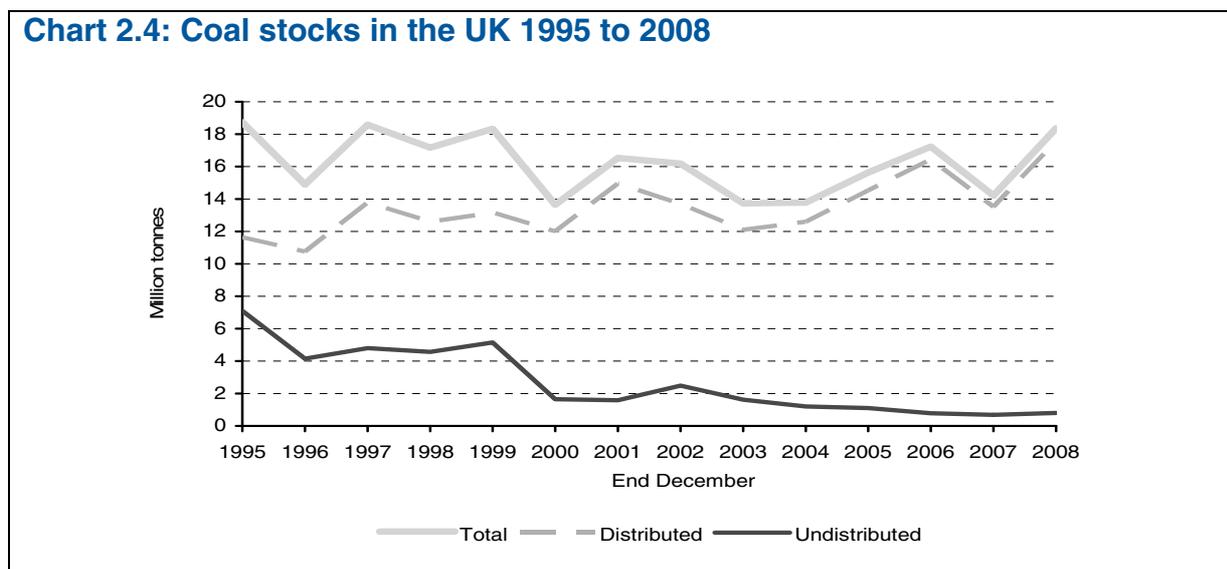
2.24 **Consumption** - Consumption by final consumers in 2008 rose by 2.0 per cent from 2007. Industry sector consumption rose by less than 1 per cent. Domestic demand increased by 5.6 per cent on 2007, to 684 thousand tonnes.

2.25 Long term trends commentary and tables on the consumption of coal in the UK since 1970 onwards can be found on the DECC energy statistics web site:

www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

2.26 **Stocks** – Production and net imports together in 2008 were higher than the demand for coal. Consequently total stock levels were just over 4 million tonnes higher at the end of 2008 compared to a year earlier. Total stocks at the end of 2008 were equivalent to around a third of the year's coal consumption. Stocks held at collieries and opencast sites at the end of 2008 were 0.1 million tonnes higher than a year earlier and stocks at major power stations and coke areas rose by 3.5 million tonnes and accounted for 87 per cent of total stocks in 2008. The recent changes in coal stocks are illustrated in Chart 2.4 below.

Chart 2.4: Coal stocks in the UK 1995 to 2008



Supply and consumption of coke oven coke, coke breeze and other manufactured fuels (Table 2.8)

2.27 This table presents figures for the most recent five years on the same basis as the balance tables. Figures for stocks are also included. Coal used to produce these manufactured fuels is shown in Table 2.7. For **coke oven coke**, demand fell by 3.1 per cent in 2008 and production fell by 2.9 per cent. In 2008 imports fell by 32 per cent from 2007 and exports rose by 5.7 per cent. Stock levels fell by 46 per cent in 2008.

2.28 In 2008, the demand for **coke breeze** fell by 2.0 per cent compared to 2007 while transfers (re-screening, see paragraph 2.45) fell by 1.0 per cent and imports also falling by 33 per cent. Production of coke breeze rose by 40 per cent (due to the reclassification of the majority of coke breeze production to coke oven coke production). There was a 25 per cent increase in the demand for **other manufactured solid fuels**, mainly for domestic use. UK production was up 33 per cent on 2007 levels.

Supply and consumption of coke oven gas, blast furnace gas, benzole and tars (Table 2.9)

2.29 This table presents figures for the most recent five years on the same basis as the other balance tables. In 2008, production of **coke oven gas** fell by 2.5 per cent and demand fell by 2.6 per cent. Use of coke oven gas in blast furnaces, and for final consumption as a whole, fell, but demand rose for use in electricity generation. Production of **blast furnace gas** fell 8.1 per cent and demand fell by 7.9 per cent in 2008 compared to 2007. Demand for benzole and tars fell by 1.0 per cent in 2008.

Structure of the coal industry (Tables 2.10 and 2.11)

2.30 As at 31 March 2009 there were six major deep mines in production in England. These were Wellbeck, Daw Mill, Kellingley and Thoresby, all operated by UK Coal PLC, plus Hatfield, which is operated by Powerfuel Mining Ltd, and Maltby, operated by the Hargreaves Group. In addition, UK Coal have a fifth mine – Harworth – which is in ‘care and maintenance’. UK Coal have plans to access reserves in a new area of coal in the Top Hard seam and currently seeking funding. Two medium-sized mines in South Wales restarted commercial production in the past year. These are Aberpergwm, operated by Energybuild Mining Ltd, and Unity, operated by Unity Mining Ltd. A further two small but significant underground mines are also in production – Eckington and Hay Royds. Surface mine output has remained constant at just over 8 million tonnes but there has been significant decline in the number of approved planning applications which dropped from 13 in 2007/08 to 7 in 2008/09. The Welsh Assembly Government introduced new planning guidance which mirrors that introduced the year before in Scotland. However this does not seem to have affected the number of planning approvals.

2.31 The deep mines that were in operation at the end of March 2009 are listed in Table 2.10. Opencast coal producers are similarly listed in Table 2.11, as well as those that are in development and not yet in operation. Further coal and slurry are supplied from recovery operations shown in the tables under “Other sources”.

Technical notes and definitions

2.32 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1, paragraphs 1.26 to 1.60. For notes on the commodity balances and definitions of the terms used in the row headings see Annex A, paragraphs A.7 to A.42. While the data in the printed and bound copy of this Digest cover only the most recent 5 years, these notes also cover data for earlier years that are available on the DECC web site.

Steam coal, coking coal and anthracite

2.33 **Steam coal** is coal classified as such by UK coal producers and by importers of coal. It tends to have calorific values at the lower end of the range.

2.34 **Coking coal** is coal sold by producers for use in coke ovens and similar carbonising processes. The definition is not therefore determined by the calorific value or caking qualities of each batch of coal sold, although calorific values tend to be higher than for steam coal.

2.35 **Anthracite** is coal classified as such by UK coal producers and importers of coal. Typically it has a high heat content making it particularly suitable for certain industrial processes and for use as a domestic fuel. Some UK anthracite producers have found a market for their lower calorific value output at power stations.

Coal production

2.36 **Deep-mined** - The statistics cover saleable output from deep mines including coal obtained from working on both revenue and capital accounts. All licensed collieries (and British Coal collieries prior to 1995) are included, even where coal is only a subsidiary product.

2.37 **Opencast** - The figures cover saleable output and include the output of sites worked by operators under agency agreements and licences, as well as the output of sites licensed for the production of coal as a subsidiary to the production of other minerals.

2.38 **Other** - Estimates of slurry etc recovered and disposed of from dumps, ponds, rivers, etc.

Imports and exports of coal and other solid fuels

2.39 Figures are derived from returns made to HM Revenue and Customs and are broken down in greater detail in Annex G on the DECC energy statistics web site at:

www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

2.40 However, in Tables 2.4, 2.5, 2.6 and 2.8, the export figures used for hard coke, coke breeze and other manufactured solid fuels for the years before 1998 (as reported on the DECC web site) are quantities of fuel exported as reported to DECC or its predecessor Departments by the companies concerned, rather than quantities recorded by HM Revenue and Customs in their Trade Statistics. A long term trend commentary and tables on exports are on the DECC energy statistics web site at: www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

Allocation of imported coal

2.41 Although data are available on consumption of home produced coal, and also on consumption of imported coal by secondary fuel producers, there is only very limited direct information on consumption of imported coal by final users. Surveys of the destination of steam coal imports (excluding those used by electricity generators) used to be carried out from time to time. The most recent was in 1998 and concluded that it was appropriate to allocate 60 per cent of such imports each year to industry, 15 per cent to the public administration sector and 25 per cent to the domestic sector. This was revised for 2002 and 2003 to 70, 25 and 5 per cent to industry, domestic and public administration respectively. These proportions were revised again in 2004 to 75 per cent to industry, 20 per cent to domestic and 5 per cent to public administration. In addition, 10 per cent of anthracite imports, excluding cleaned smalls, are allocated to industry, with 90 per cent to the domestic sector in all years shown in the tables. From 2000, imports have been allocated within the overall industry sector using the results of the Office for National Statistics Purchases Inquiry, and information derived from the EU Emissions Trading Scheme submissions. All imports of coking coal and cleaned anthracite smalls are allocated to coke and other solid fuel producers.

Stocks of coal

2.42 Undistributed stocks are those held at collieries and opencast sites. It is not possible to distinguish these two locations in the stock figures. Distributed stocks are those held at power stations and stocking grounds of the major power producing companies (as defined in Chapter 5, paragraph 5.57), coke ovens, low temperature carbonisation plants and patent fuel plants.

Transformation, energy industry use and consumption of solid fuels

2.43 Annex A of this Digest outlines the principles of energy and commodity balances and defines the activities that fall within these parts of the balances. However, the following additional notes relevant to solid fuels are given below:

Transformation: Blast furnaces - Coking coal injected into blast furnaces is shown separately within the balance tables.

Transformation: Low temperature carbonisation plants and patent fuel plants - Coal used at these plants for the manufacture of domestic coke such as Coalite and of briquetted fuels such as Phurnacite and Homefire.

Consumption: Industry - The statistics comprise sales of coal by the ten main coal producers to the iron and steel industry (excluding that used at coke ovens and blast furnaces) and to other industrial sectors and estimated proportions of anthracite and steam coal imports. The figures exclude coal used for industries' own generation of electricity, which appear separately under transformation.

Consumption: Domestic – Some coal is supplied free of charge to retired miners and other retired eligible employees through the National Concessionary Fuel Scheme (NCFS). The concessionary fuel provided in 2008 is estimated at 75.4 thousand tonnes. This estimate is included in the domestic steam coal and domestic anthracite figures.

Consumption of coke and other manufactured solid fuels - These are disposals from coke ovens to merchants. The figures also include estimated proportions of coke imports.

Coke oven coke (hard coke) and hard coke breeze

2.44 The statistics cover coke produced at coke ovens owned by Corus plc, Coal Products Ltd and other producers. Low temperature carbonisation plants are not included (see paragraph 2.47, below). Breeze (as defined in paragraph 2.45) is excluded from the figures for coke oven coke.

2.45 Breeze can generally be described as coke screened below 19 mm ($\frac{3}{4}$ inch) with no fines removed, but the screen size may vary in different areas and to meet the requirements of particular markets. Coke that has been transported from one location to another is usually re-screened before use to remove smaller sizes, giving rise to further breeze.

2.46 In 1998, an assessment using industry data showed that on average over the previous five years 91 per cent of imports had been coke and 9 per cent breeze and it is these proportions that have been used for 1998 and subsequent years in Tables 2.4, 2.5, 2.6 and 2.8.

2.47 Other manufactured solid fuels are mainly solid smokeless fuels for the domestic market for use in both open fires and in boilers. A smaller quantity is exported (although exports are largely offset by similar quantities of imports in most years). Manufacture takes place in patented fuel plants and low temperature carbonisation plants. The brand names used for these fuels include Homefire, Phurnacite, Ancit and Coalite.

Blast furnace gas, coke oven gas, benzole and tars

2.48 The following definitions are used in the tables that include these fuels:

Blast furnace gas - includes basic oxygen steel furnace (BOS) gas. Blast furnace gas is the gas produced during iron ore smelting when hot air passes over coke within the blast ovens. It contains carbon monoxide, carbon dioxide, hydrogen and nitrogen. In a basic oxygen steel furnace the aim is not to introduce nitrogen or hydrogen into the steel making process, so pure oxygen gas and suitable fluxes are used to remove the carbon and phosphorous from the molten pig iron and steel scrap. A similar fuel gas is thus produced.

Coke oven gas - is a gas produced during the carbonisation of coal to form coke at coke ovens.

Synthetic coke oven gas - is mainly natural gas that is mixed with smaller amounts of blast furnace and BOS gas to produce a gas with almost the same qualities as coke oven gas. The transfers row of Tables 2.4, 2.5, 2.6 and 2.8 show the quantities of blast furnace gas used for this purpose and the total input of gases to the synthetic coke oven gas process. There is a corresponding outward transfer from natural gas in Chapter 4, Table 4.1.

Benzole - a colourless, liquid, flammable, aromatic hydrocarbon by-product of the iron and steel making process. It is used as a solvent in the manufacture of styrenes and phenols but can also be used as a motor fuel.

Tars - viscous materials usually derived from the destructive distillation of coal, which are by-products of the coke and iron making processes.

Periods covered

2.49 Figures in this chapter (and figures for earlier years given in the tables on the DECC web site) generally relate to periods of 52 weeks or 53 weeks. For the most recent five years the periods are:

Year	52 weeks ended
2004	25 December 2004
	53 weeks ended
2005	31 December 2005
	52 weeks ended
2006	30 December 2006
2007	29 December 2007
	Calendar year ending
2008	31 December 2008

The 53 week data for 2005 have been adjusted to 52 weeks by omitting data for an average week based on information provided by the largest companies for the first week in April 2005.

The statistical year 2008 is 4 days longer than the standard 52 week statistical reporting period (SRP) for January to December 2008. This is to enable a smooth transition to publishing data in Energy Trends and the Digest of United Kingdom Energy Statistics on a calendar month basis from January 2009 rather than 4 and 5 week SRPs used for previous years.

2.50 Data for coal used for electricity generation by major power producers follow the electricity industry calendar (see Chapter 5, paragraph 5.67) and coal use by other generators is for the 12 months ending 31 December each year. HM Revenue and Customs data on imports and exports are also for the 12 months ended 31 December each year. Data for coal and coke use in the iron and steel industry, and for gases, benzole and tars produced by the iron and steel industry follow the iron and steel industry calendar (see Chapter 5, paragraph 5.68).

Data collection

2.51 In 2008, aggregate data on coal production were obtained from the Coal Authority. In addition the largest producers (Celtic Energy, Energybuild, H J Banks, Hall Construction Services Ltd (formerly known as Coal Contractors Limited), J D Flack & Sons Ltd, Scottish Coal Company Ltd, UK Coal plc, Maltby Colliery Ltd and Powerfuel Mining Ltd) have provided data in response to an annual DECC inquiry covering production (deep-mined and opencast), trade, stocks and disposals. The Iron and Steel Statistics Bureau (ISSB) provides DECC with an annual statement of coke and breeze production and use of coal, coke and breeze within that industry. The ISSB is also the source of data on gases produced by the iron and steel industry (coke oven gas, blast furnace gas and basic oxygen steel furnace gas). DECC directly surveys producers of manufactured fuels other than coke or breeze.

2.52 Trade in solid fuels is also covered by using data from HM Revenue and Customs (see Annex G on the DECC energy statistics web site). Consumption of coal for electricity generation is covered

by data collected by DECC from electricity generators as described in Chapter 5, paragraphs 5.70 to 5.72.

Monthly and quarterly data

2.53 Monthly data on coal production, foreign trade, consumption and stocks are available on DECC's Energy Statistics web site: www.decc.gov.uk/en/content/cms/statistics/source/coal/coal.aspx in monthly Tables 2.4, 2.5, and 2.6. Quarterly commodity balances for coal, coke oven coke, coke breeze and other manufactured solid fuels; and coke oven gas, blast furnace gas, benzole and tars are published in DECC's quarterly statistical bulletin *Energy Trends*. These balances are also available on DECC's Energy Statistics web site. See Annex C for more information about *Energy Trends* and the DECC energy statistics web site.

Statistical differences

2.54 Tables 2.1 to 2.9 each contain a statistical difference term covering the difference between recorded supply and recorded demand. These statistical differences arise for a number of reasons. First, the data within each table are taken from varied sources, as described above, for example producers, intermediate consumers (such as electricity generators), final consumers and HM Revenue and Customs. Second, some of these industries work to different statistical calendars (see paragraphs 2.49 and 2.50, above) and third, some of the figures are estimated either because data in the required detail are not readily available within the industry or because the methods of collecting the data do not cover the smallest members of the industry.

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2.1 Commodity balances 2008

Coal

Thousand tonnes

	Steam coal	Coking coal	Anthracite	Total
Supply				
Production	..	307	..	17,604
Other sources	..	-	..	449
Imports	37,382	6,349	144	43,875
Exports	-357	-139	-104	-599
Marine bunkers	-	-	-	-
Stock change (1)	..	+414	..	-3,395
Transfers	-	-	-	-
Total supply	..	6,930	..	57,935
Statistical difference (2)	..	-114	..	-278
Total demand	49,787	7,045	1,381	58,212
Transformation	47,442	7,045	1,134	55,621
Electricity generation	46,984	-	817	47,801
Major power producers	45,461	-	817	46,278
Autogenerators	1,523	-	-	1,523
Heat generation	458	-	-	458
Petroleum refineries	-	-	-	-
Coke manufacture	-	5,875	-	5,875
Blast furnaces	-	1,170	-	1,170
Patent fuel manufacture and low temperature carbonisation	-	-	317	317
Energy industry use	5	-	-	5
Electricity generation	-	-	-	-
Oil and gas extraction	-	-	-	-
Petroleum refineries	-	-	-	-
Coal extraction	5	-	-	5
Coke manufacture	-	-	-	-
Blast furnaces	-	-	-	-
Patent fuel manufacture	-	-	-	-
Pumped storage	-	-	-	-
Other	-	-	-	-
Losses	-	-	-	-
Final consumption	2,339	-	246	2,586
Industry	1,790	-	82	1,872
Unclassified	-	-	-	-
Iron and steel	-	-	-	1
Non-ferrous metals	..	-	..	33
Mineral products	..	-	..	1,150
Chemicals	..	-	..	144
Mechanical engineering etc	..	-	..	14
Electrical engineering etc	..	-	..	6
Vehicles	..	-	..	48
Food, beverages etc	..	-	..	39
Textiles, leather, etc	..	-	..	76
Paper, printing etc	..	-	..	149
Other industries	..	-	..	212
Construction	-	-	-	-
Transport	-	-	-	-
Air	-	-	-	-
Rail	-	-	-	-
Road	-	-	-	-
National navigation	-	-	-	-
Pipelines	-	-	-	-
Other	..	-	..	714
Domestic	521	-	164	684
Public administration	..	-	..	14
Commercial	..	-	..	10
Agriculture	..	-	..	5
Miscellaneous	..	-	..	1
Non energy use	-	-	-	-

(1) Stock fall (+), stock rise (-).

(2) Total supply minus total demand.

2.2 Commodity balances 2007

Coal

Thousand tonnes

	Steam coal	Coking coal	Anthracite	Total
Supply				
Production	..	266	..	16,540
Other sources	..	-	..	467
Imports	35,746	7,482	137	43,365
Exports	-428	-13	-103r	-544r
Marine bunkers	-	-	-	-
Stock change (1)	..	-565	..	+2,949r
Transfers	-	-	-	-
Total supply	..	7,170	..	62,777r
Statistical difference (2)	..	-5	..	-155r
Total demand	54,533r	7,175	1,224r	62,932r
Transformation	52,255r	7,175	961r	60,391r
Electricity generation	51,798r	-	716r	52,515r
Major power producers	50,315r	-	716r	51,031r
Autogenerators	1,484r	-	-	1,484r
Heat generation	456	-	-	456
Petroleum refineries	-	-	-	-
Coke manufacture	-	5,933	-	5,933
Blast furnaces	-	1,242	-	1,242
Patent fuel manufacture and low temperature carbonisation	-	-	245	245
Energy industry use	5	-	1	5
Electricity generation	-	-	-	-
Oil and gas extraction	-	-	-	-
Petroleum refineries	-	-	-	-
Coal extraction	5	-	1	5
Coke manufacture	-	-	-	-
Blast furnaces	-	-	-	-
Patent fuel manufacture	-	-	-	-
Pumped storage	-	-	-	-
Other	-	-	-	-
Losses	-	-	-	-
Final consumption	2,274r	-	262	2,536r
Industry	1,786r	-	76	1,862r
Unclassified	-	-	-	-
Iron and steel	-	-	-	1
Non-ferrous metals	..	-	..	36
Mineral products	..	-	..	1,150r
Chemicals	..	-	..	143
Mechanical engineering etc	..	-	..	10
Electrical engineering etc	..	-	..	6
Vehicles	..	-	..	49
Food, beverages etc	..	-	..	41
Textiles, leather, etc	..	-	..	74
Paper, printing etc	..	-	..	144
Other industries	..	-	..	208r
Construction	-	-	-	-
Transport	-	-	-	-
Air	-	-	-	-
Rail	-	-	-	-
Road	-	-	-	-
National navigation	-	-	-	-
Pipelines	-	-	-	-
Other	..	-	..	674
Domestic	462	-	186	648
Public administration	..	-	..	14
Commercial	..	-	..	6
Agriculture	..	-	..	4
Miscellaneous	..	-	..	2
Non energy use	-	-	-	-

(1) Stock fall (+), stock rise (-).

(2) Total supply minus total demand.

2.3 Commodity balances 2006

Coal

Thousand tonnes

	Steam coal	Coking coal	Anthracite	Total
Supply				
Production	..	266	..	18,079
Other sources	..	-	..	438
Imports	43,609	6,775	145	50,529
Exports	-349	-1	-94	-443
Marine bunkers	-	-	-	-
Stock change (1)	..	+4	..	-1,262
Transfers	-	-	-	-
Total supply	..	7,044	..	67,341
Statistical difference (2)	..	-6	..	-182r
Total demand	58,953r	7,050	1,520	67,522r
Transformation	56,907r	7,050	1,264	65,221r
Electricity generation	56,450r	-	988	57,438r
Major power producers	54,938r	-	988	55,927r
Autogenerators	1,511r	-	-	1,511r
Heat generation	457	-	-	457
Petroleum refineries	-	-	-	-
Coke manufacture	-	5,929	-	5,929
Blast furnaces	-	1,121	-	1,121
Patent fuel manufacture and low temperature carbonisation	-	-	276	276
Energy industry use	3	-	1	4
Electricity generation	-	-	-	-
Oil and gas extraction	-	-	-	-
Petroleum refineries	-	-	-	-
Coal extraction	3	-	1	4
Coke manufacture	-	-	-	-
Blast furnaces	-	-	-	-
Patent fuel manufacture	-	-	-	-
Pumped storage	-	-	-	-
Other	-	-	-	-
Losses	-	-	-	-
Final consumption	2,043r	-	255	2,298r
Industry	1,660	-	44	1,703r
Unclassified	-	-	-	-
Iron and steel	-	-	-	1r
Non-ferrous metals	..	-	..	60
Mineral products	..	-	..	1,047
Chemicals	..	-	..	85
Mechanical engineering etc	..	-	..	12
Electrical engineering etc	..	-	..	6
Vehicles	..	-	..	53
Food, beverages etc	..	-	..	25
Textiles, leather, etc	..	-	..	70
Paper, printing etc	..	-	..	141
Other industries	..	-	..	205
Construction	-	-	-	-
Transport	-	-	-	-
Air	-	-	-	-
Rail	-	-	-	-
Road	-	-	-	-
National navigation	-	-	-	-
Pipelines	-	-	-	-
Other	..	-	..	595r
Domestic	347r	-	212	559r
Public administration	..	-	..	20
Commercial	..	-	..	6
Agriculture	..	-	..	5
Miscellaneous	..	-	..	5
Non energy use	-	-	-	-

(1) Stock fall (+), stock rise (-).

(2) Total supply minus total demand.

2.4 Commodity balances 2008

Manufactured fuels

	Thousand tonnes				GWh		
	Coke oven coke	Coke breeze	Other manuf. solid fuel	Total manuf. solid fuel	Benzole and tars (5)	Coke oven gas	Blast furnace gas
Supply							
Production (1)	4,324	35	302	4,661	1,799	9,410	15,345
Other sources	-	-	-	-	-	-	-
Imports	503	219	16	738	-	-	-
Exports	-111	-74	-25	-210	-	-	-
Marine bunkers	-	-	-	-	-	-	-
Stock change (2)	+285	-80	-	+206	-	-	-
Transfers (3)	-1,104	+1,104	-	-	-	+71	-3
Total supply	3,897	1,205	293	5,395	1,799	9,481	15,342
Statistical difference (4)	-2	-	-1	-3	-	+50	-139
Total demand	3,900	1,204	294	5,398	1,799	9,431	15,481
Transformation	3,796	567	-	4,363	-	2,681	7,900
Electricity generation	-	-	-	-	-	2,263	7,721
Major power producers	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	2,263	7,721
Heat generation	-	-	-	-	-	418	179
Petroleum refineries	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-
Blast furnaces	3,796	567	-	4,363	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-
Low temperature carbonisation	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	5,122	4,759
Electricity generation	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	4,354	639
Blast furnaces	-	-	-	-	-	768	4,121
Patent fuel manufacture	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
Losses	-	-	-	-	-	413	2,332
Final consumption	104	638	294	1,036	1,799	1,216	490
Industry	90	638	-	728	1,799	1,216	490
Unclassified	77	16	-	93	1,799	207	-
Iron and steel	13	621	-	635	-	1,009	490
Non-ferrous metals	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-	-
Paper, printing, etc	-	-	-	-	-	-	-
Other industries	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-
Other	14	-	294	308	-	-	-
Domestic	14	-	294	308	-	-	-
Public administration	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-
Agriculture	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-

(1) See paragraph 2.26

(2) Stock fall (+), stock rise (-).

(3) Coke oven gas and blast furnace gas transfers are for synthetic coke oven gas, see paragraph 2.48.

(4) Total supply minus total demand.

(5) Because of the small number of benzole suppliers, figures for benzole and tars cannot be given separately.

2.5 Commodity balances 2007

Manufactured fuels

	Thousand tonnes				GWh		
	Coke oven coke	Coke breeze	Other manuf. solid fuel	Total manuf. solid fuel	Benzole and tars (5)	Coke oven gas	Blast furnace gas
Supply							
Production (1)	4,451	25	227	4,703	1,818r	9,651	16,701
Other sources	-	-	-	-	-	-	-
Imports	745	325r	13r	1,083r	-	-	-
Exports	-105	-152	-7r	-264r	-	-	-
Marine bunkers	-	-	-	-	-	-	-
Stock change (2)	+34	-80	+2	-44	-	-	-
Transfers (3)	-1,115	+1,115	-	-	-	+81	-3
Total supply	4,010	1,233r	235r	5,478r	1,818r	9,732	16,698
Statistical difference (4)	-14	+3	-	-11r	-	+47	-113
Total demand	4,024	1,229r	235r	5,485	1,818r	9,685	16,811
Transformation	3,910	483	-	4,392	-	2,525	8,971
Electricity generation	-	-	-	-	-	2,107	8,791
Major power producers	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	2,107	8,791
Heat generation	-	-	-	-	-	418	179
Petroleum refineries	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-
Blast furnaces	3,910	483	-	4,392	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-
Low temperature carbonisation	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	5,170	5,082
Electricity generation	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	4,228	703
Blast furnaces	-	-	-	-	-	942	4,379
Patent fuel manufacture	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
Losses	-	-	-	-	-	445	2,071
Final consumption	114	747r	235r	1,093	1,818r	1,545	688
Industry	99	747r	-	846r	1,818r	1,545	688
Unclassified	76	13r	-	89r	1,818r	221	-
Iron and steel	23	734	-	757	-	1,324	688
Non-ferrous metals	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-	-
Paper, printing, etc	-	-	-	-	-	-	-
Other industries	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-
Other	15	-	235r	249r	-	-	-
Domestic	15	-	235r	249r	-	-	-
Public administration	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-
Agriculture	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-

(1) See paragraph 2.26

(2) Stock fall (+), stock rise (-).

(3) Coke oven gas and blast furnace gas transfers are for synthetic coke oven gas, see paragraph 2.48.

(4) Total supply minus total demand.

(5) Because of the small number of benzole suppliers, figures for benzole and tars cannot be given separately.

2.6 Commodity balances 2006

Manufactured fuels

	Thousand tonnes				GWh		
	Coke oven coke	Coke breeze	Other manuf. solid fuel	Total manuf. solid fuel	Benzole and tars (4)	Coke oven gas	Blast furnace gas
Supply							
Production	4,384	245	260	4,889	1,873	9,828	16,443
Other sources	-	-	-	-	-	-	-
Imports	748	261	10	1,019	-	-	-
Exports	-94	-74	-12	-180	-	-	-
Marine bunkers	-	-	-	-	-	-	-
Stock change (1)	-237	+25	+2	-211	-	-	-
Transfers (2)	-955	+955	-	-	-	+55	-2
Total supply	3,846	1,411	260	5,518	1,873	9,882	16,441
Statistical difference (3)	-1r	-4	+3	-2r	-	+76	-119
Total demand	3,847r	1,415	257	5,519r	1,873	9,806	16,560
Transformation	3,745	688	-	4,433	-	2,593	9,249
Electricity generation	-	-	-	-	-	2,175	9,070
Major power producers	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	2,175	9,070
Heat generation	-	-	-	-	-	418	179
Petroleum refineries	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-
Blast furnaces	3,745	688	-	4,433	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-
Low temperature carbonisation	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	5,300	4,831
Electricity generation	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	4,282	536
Blast furnaces	-	-	-	-	-	1,019	4,294
Patent fuel manufacture	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
Losses	-	-	-	-	-	483	1,578
Final consumption	102r	727	257	1,086r	1,873	1,430	902
Industry	80r	727	-	807r	1,873	1,430	902
Unclassified	53r	26	-	79r	1,873	194	-
Iron and steel	26	701	-	727	-	1,236	902
Non-ferrous metals	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-	-
Paper, printing, etc	-	-	-	-	-	-	-
Other industries	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-
Other	22r	-	257	279r	-	-	-
Domestic	22r	-	257	279r	-	-	-
Public administration	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-
Agriculture	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-

(1) Stock fall (+), stock rise (-).

(2) Coke oven gas and blast furnace gas transfers are for synthetic coke oven gas, see paragraph 2.48.

(3) Total supply minus total demand.

(4) Because of the small number of benzole suppliers, figures for benzole and tars cannot be given separately.

2.7 Supply and consumption of coal

Thousand tonnes

	2004	2005	2006	2007	2008
Supply					
Production	24,535	20,008	18,079	16,540	17,604
Deep-mined	12,542	9,563	9,444	7,674	8,096
Opencast	11,993	10,445	8,635	8,866	9,509
Other sources (1)	561	490	438	467	449
Imports	36,153	43,968	50,529	43,365	43,875
Exports	-622	-536	-443	-544r	-599
Stock change (2)	-60	-2,151	-1,262	+2,949r	-3,395
Total supply	60,567	61,780	67,341	62,777r	57,935
Statistical difference (3)	+117	-62	-182r	-155r	-278
Total demand	60,451	61,842	67,522r	62,932r	58,212
Transformation	57,626	59,392	65,221r	60,391r	55,621
Electricity generation	50,444	52,058	57,438r	52,515r	47,801
Major power producers	48,968	50,582	55,927r	51,031r	46,278
Autogenerators	1,476	1,476	1,511r	1,484r	1,523
Heat generation	473	459	457	456	458
Coke manufacture	5,487	5,570	5,929	5,933	5,875
Blast furnaces	895	1,039	1,121	1,242	1,170
Patent fuel manufacture and low temperature carbonisation	327	266	276	245	317
Energy industry use	8	6	4	5	5
Coal extraction	8	6	4	5	5
Final consumption	2,816	2,445	2,298r	2,536r	2,586
Industry	1,848	1,781	1,703r	1,862r	1,872
Unclassified	-	-	-	-	-
Iron and steel	-	-	1r	1	1
Non-ferrous metals	12	41	60	36	33
Mineral products	1,127	1,120	1,047	1,150r	1,150
Chemicals	148	132	85	143	144
Mechanical engineering etc	13	12	12	10	14
Electrical engineering etc	5	5	6	6	6
Vehicles	80	55	53	49	48
Food, beverages etc	38	26	25	41	39
Textiles, clothing, leather, etc	82	71	70	74	76
Pulp, paper, printing etc	141	142	141	144	149
Other industries	203	178	205	208r	212
Construction	-	-	-	-	-
Transport	-	-	-	-	-
Other	968	663	595r	674	714
Domestic	941	614	559r	648	684
Public administration	13	32	20	14	14
Commercial	5	6	6	6	10
Agriculture	8	9	5	4	5
Miscellaneous	2	2	5	2	1
Non energy use	-	-	-	-	-
Stocks at end of year (4)					
Distributed stocks	12,598	14,527	16,442r	13,525r	17,576
Of which:					
Major power producers	11,019	12,696	14,813r	11,179r	14,863
Coke ovens	1,291	1,317	962	1,494r	1,066
Undistributed stocks	1,192	1,101	783	691	795
Total stocks (5)	13,791	15,628	17,226r	14,215r	18,371

(1) Estimates of slurry etc. recovered from ponds, dumps, rivers, etc.

(2) Stock fall (+), stock rise (-).

(3) Total supply minus total demand.

(4) Excludes distributed stocks held in merchants' yards, etc., mainly for the domestic market, and stocks held by the industrial sector.

(5) For some years, closing stocks may not be consistent with stock changes, due to additional stock adjustments

2.8 Supply and consumption of coke oven coke, coke breeze and other manufactured solid fuels

	Thousand tonnes				
	2004	2005	2006	2007	2008
Coke oven coke					
Supply					
Production	4,038	4,105	4,384	4,451	4,324
Imports	847	674	748	745	503
Exports	-80	-64	-94	-105	-111
Stock change (1)	-88	-94	-237	+34	+285
Transfers	-1,012	-983	-955	-1,115	-1,104
Total supply	3,704	3,638r	3,846	4,010	3,897
Statistical difference (2)	-14	-2	-1r	-14	-2
Total demand	3,718	3,639	3,847r	4,024	3,900
Transformation	3,569	3,516	3,745	3,910	3,796
Blast furnaces	3,569	3,516	3,745	3,910	3,796
Energy industry use	-	-	-	-	-
Final consumption	149	123	102r	114	104
Industry	98	89	80r	99	90
Unclassified	76	67	53r	76	77
Iron and steel	22	22	26	23	13
Non-ferrous metals	-	-	-	-	-
Other	51	34	22r	15	14
Domestic	51	34	22r	15	14
Stocks at end of year (3)	318	413	650	616	331
Coke breeze					
Supply					
Production (4)	298	259	245	25	35
Imports	199	235	261	325r	219
Exports	-62	-55	-74	-152	-74
Stock change (1)	-63	-59	+25	-80	-80
Transfers	+1,012	+983	955	1,115	1,104
Total supply	1,363	1,337	1,411	1,233r	1,205
Statistical difference (2)	-1	-	-4	+3	-
Total demand	1,364	1,337	1,415	1,229r	1,204
Transformation	568	551	688	483	567
Coke manufacture	-	-	-	-	-
Blast furnaces	568	551	688	483	567
Energy industry use	-	-	-	-	-
Final consumption	827	796	727	747r	638
Industry	827	796	727	747r	638
Unclassified	39	14	26	13r	16
Iron and steel	788	782	701	734	621
Stocks at end of year (3)	359	418	394	473	553
Other manufactured solid fuels					
Supply					
Production	318	258	260	227	302
Imports	5	6	10	13r	16
Exports	-39	-15	-12	-7r	-25
Stock change (1)	+22	+6	+2	+2	-
Total supply	305	254	260	235r	293
Statistical difference (2)	-14	-2	+3	-	-1
Total demand	320	256	257	235r	294
Transformation	-	-	-	-	-
Energy industry use	4	-	-	-	-
Patent fuel manufacture	4	-	-	-	-
Final consumption	316	256	257	235r	294
Industry	12	-	-	-	-
Unclassified	12	-	-	-	-
Other	303	256	257	235r	294
Domestic	303	256	257	235r	294
Stocks at end of year (3)	30	24	25	27r	26

(1) Stock fall (+), stock rise (-).

(2) Total supply minus total demand.

(3) Producers stocks and distributed stocks.

(4) See paragraph 2.26

2.9 Supply and consumption of coke oven gas, blast furnace gas, benzole and tars

	GWh				
	2004	2005	2006	2007	2008
Coke oven gas					
Supply					
Production	9,076	9,290	9,828	9,651	9,410
Imports	-	-	-	-	-
Exports	-	-	-	-	-
Transfers (1)	+40	+53	+55	+81	+71
Total supply	9,116	9,343	9,882	9,732	9,481
Statistical difference (2)	+65	+64	+76	+47	+50
Total demand	9,051	9,279	9,806	9,685	9,431
Transformation					
Electricity generation	1,526	2,207	2,175	2,107	2,263
Heat generation	418	418	418	418	418
Other	-	-	-	-	-
Energy industry use	5,273	5,064	5,300	5,170	5,122
Coke manufacture	4,326	4,321	4,282	4,228	4,354
Blast furnaces	948	743	1,019	942	768
Other	-	-	-	-	-
Losses	783	441	483	445	413
Final consumption	1,050	1,149	1,430	1,545	1,216
Industry					
Unclassified	265	236	194	221	207
Iron and steel	785	913	1,236	1,324	1,009
Blast furnace gas					
Supply					
Production	15,770	16,199	16,443	16,701	15,345
Imports	-	-	-	-	-
Exports	-	-	-	-	-
Transfers (1)	-2	-2	-2	-3	-3
Total supply	15,768	16,197	16,441	16,698	15,342
Statistical difference (2)	-103	-107	-119	-113	-139
Total demand	15,872	16,304	16,560	16,811	15,481
Transformation					
Electricity generation (3)	9,191	9,310	9,070	8,791	7,721
Heat generation	179	179	179	179	179
Other	-	-	0	0	0
Energy industry use	4,570	4,474	4,831	5,082	4,759
Coke manufacture	297	285	536	703	639
Blast furnaces	4,273	4,189	4,294	4,379	4,121
Other	-	-	-	-	-
Losses	1,557	2,014	1,578	2,071	2,332
Final consumption	375	326	902	688	490
Industry					
Unclassified	-	-	-	-	-
Iron and steel (3)	375	326	902	688	490
Benzole and tars (4)					
Supply					
Production	1,722	1,750	1,873	1,818r	1,799
Final consumption (5)	1,722	1,750	1,873	1,818r	1,799
Unclassified	1,722	1,750	1,873	1,818r	1,799
Iron and steel	-	-	-	-	-

(1) To and from synthetic coke oven gas, see paragraph 2.48.

(2) Total supply minus total demand.

(3) From 2003, a new method of calculating fuel use for CHP in the iron and steel industry has been used (see paragraph 6.32). This results in more blast furnace gas being allocated to electricity generation and less to final consumption than in previous years. It has not been possible to recalculate CHP use for previous years on this new basis.

(4) Because of the small number of benzole suppliers, figures for benzole and tars cannot be given separately.

(5) From 2000 Iron and steel under final consumption has been reclassified due to additional information being received.

2.10 Deep mines in production at 31 March 2009⁽¹⁾

Licensee	Site	Location
Blanentillery Mining Partnership	Blanentillery No.2 Colliery	Torfaen
Eckington Colliery Partnerships	Eckington Colliery	Derbyshire
Energybuild Mining Ltd	Aberpergwm Colliery	Neath Port Talbot
J Flack Ltd	Hay Royds Colliery	Kirklees
Maltby Colliery Ltd	Maltby Colliery	Rotherham
NH Colliery Ltd	Nant Hir No.2 Colliery	Neath Port Talbot
Powerfuel Mining Ltd	Hatfield Colliery	Doncaster
Ray Ashly, Richard Daniels and Neil Jones	Monument Colliery	Gloucestershire
S Harding & R Harding	Cannop Drift Mine	Gloucestershire
UK Coal Mining Ltd	Daw Mill Colliery	Warwickshire
	Kellingley Colliery	North Yorkshire
	Thoresby Colliery	Nottinghamshire
	Welbeck Colliery	Nottinghamshire

(1) In addition, at 31 March 2009, there was:

4 mines developing -

Ayle Colliery, owned by Ayle Colliery Company Ltd, in Northumberland

Gleison Colliery, owned by Coal Direct Ltd, in Neath Port Talbot

Johnson Mine, owned by Riche UK Mining Ltd, in Torfaen

Unity Mine, owned by Unity Mine Ltd, in Neath Port Talbot

Source: The Coal Authority

2.11 Opencast sites in production at 31 March 2009⁽¹⁾

Licensee	Site Name	Location
Aardvaark TMC Ltd (trading as ATH Resources)	Glenmuckloch	Dumfries & Galloway
	Grievehill Site	East Ayrshire
	Leigh Glenmuir Site	East Ayrshire
	Muir Dean	Fife
	Skares Road	East Ayrshire
Bryn Bach Coal Ltd	Cwm Yr Onen Colliery Reclamation	Neath Port Talbot
Celtic Energy Ltd	East Pit	Neath Port Talbot
	Nant Helen	Powys
	Selar	Neath Port Talbot
Energybuild Ltd	Nant-y-Mynydd Site	Neath Port Talbot
H J Banks (Mining) Ltd	Shotton	Northumberland
Hall Construction Services Ltd	Wilsontown	South Lanarkshire
Holgate Aggregates Ltd	Temple Quarry	Kirklees
Kier Minerals Ltd	Greenburn Project	East Ayrshire
Miller Argent (South Wales) Ltd	Ffos-y-Fran Land Reclamation Scheme	Merthyr Tydfil
Shires Developments (Engine) Ltd	Engine	Derbyshire
Shires Developments Ltd	Corporal Lane Quarry	Halifax
The Scottish Coal Company Ltd	Broken Corss	South Lanarkshire
	Chalmerston	East Ayrshire
	Chapelhill Site	South Lanarkshire
	Glentaggart	South Lanarkshire
	Greenbank (St Ninians)	Fife
	Thornton Wood (St Ninians)	Fife
	House of Water	East Ayrshire
	Dalquhandy Residual	South Lanarkshire
	Poniel	South Lanarkshire
	Powharnal	East Ayrshire
	Shewington	Midlothian
	Spireslack	East Ayrshire
	UK Coal Mining Ltd	Cutacre	Bolton
Lodge House		Derbyshire
Long Moor		Leicestershire
Steadsburn		Northumberland

(1) In addition, at 31 March 2009, there was:

2 mines developing -

Caughley Quarry, owned by Parkhill Estates Ltd, in Shropshire

Bwich Ffos, owned by Tarmac Ltd, in Neath Port Talbot

Source: The Coal Authority

Chapter 3

Petroleum

Introduction

3.1 This chapter contains commodity balances covering the supply and disposal of primary oils (crude oil and natural gas liquids), feedstocks (including partly processed oils) and petroleum products in the UK during the period 2006 to 2008. These balances are given in Tables 3.1 to 3.4. Additional data have been included in supplementary tables on areas not covered by the format of the balances. This extra information includes details on refinery capacities and aggregates for refinery operations, as well as additional detail on deliveries into consumption, including breakdowns by sector and industry.

3.2 Statistics of imports and exports of crude oil, other refinery feedstocks and petroleum products, refinery receipts, refinery throughput and output and deliveries of petroleum products are obtained from the United Kingdom oil industry and the Department of Energy and Climate Change's (DECC) Petroleum Production Reporting System.

3.3 The annual figures relate to calendar years or the end of calendar years. Unless otherwise stated, the data in the tables cover the United Kingdom.

3.4 An article comparing balances over the 60 years of the Digest has been produced as a supplement to this edition. Information on long-term trends (Tables 3.1.1 and 3.1.2) and the annex on the oil and gas resources in the UK (Annex F) provide a more complete picture of the UK oil and gas production sector and are only available in the internet version of this publication which can be found on the DECC web site at www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx.

3.5 A flow chart of the movement of crude oil, other refinery feedstocks and petroleum products for 2008 has been provided, showing the flow from indigenous production and imports to eventual uses. The flows are measured in million tonnes and the width of the bands approximately proportional to the size of the flow they represent.

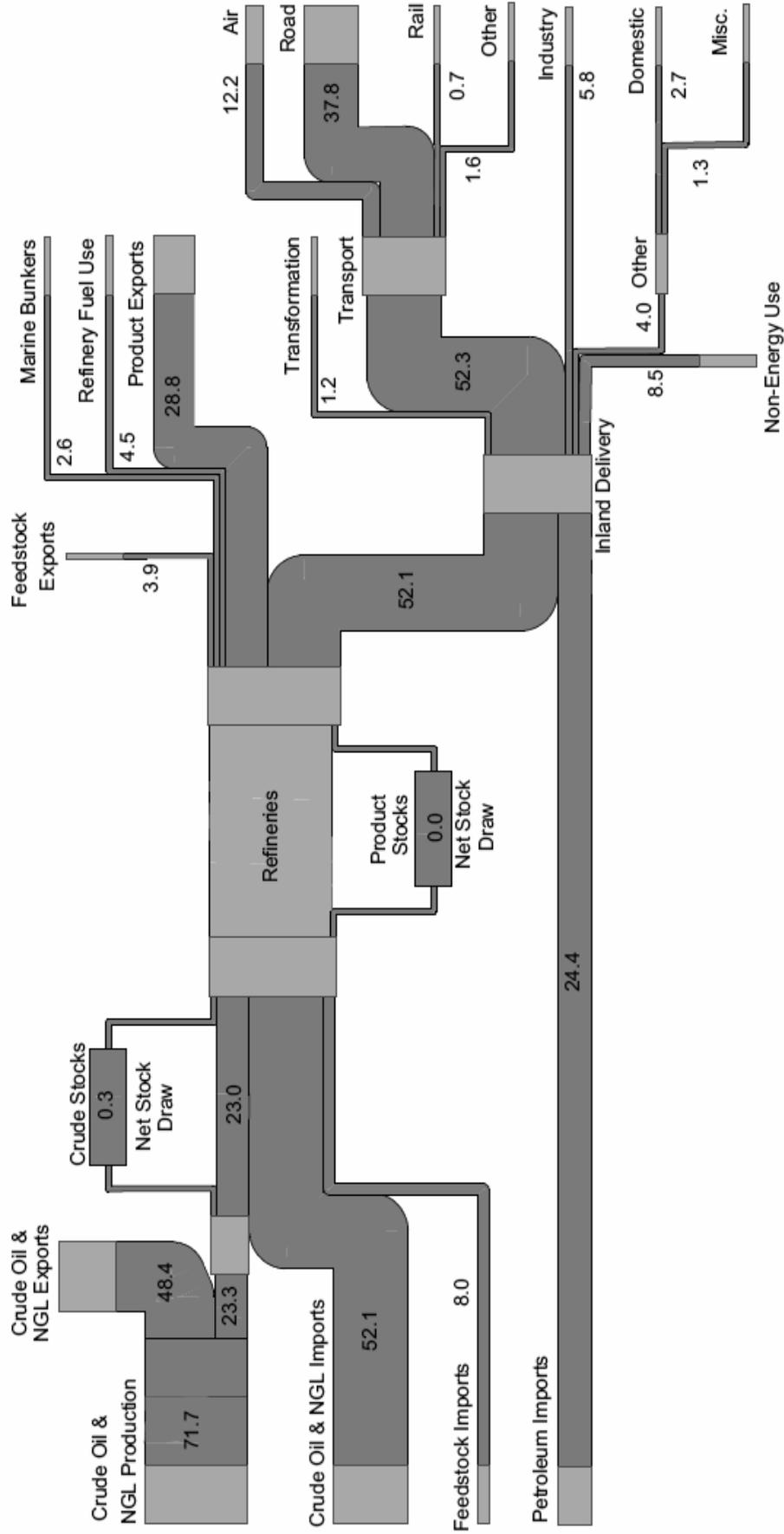
Commodity balances for primary oil (Table 3.1)

3.6 This table shows details of the production, supply and disposals of primary oils (crude oil and natural gas liquids (NGLs)) and feedstocks in 2006, 2007 and 2008. The table examines the supply chain from the production of oil and NGLs, recorded by individual oil terminals and oil fields, to their disposal to export or to UK refineries (see Annex F, Table F.2 on DECC's energy statistics web site). It also covers the use of these primary oils as recorded by the refineries. Therefore the statistical difference in the tables represents the differences between data reported by these different sources and the sites of production and consumption.

3.7 Gross production of crude oil and NGLs in 2008 was 72 million tonnes, 5 million tonnes lower than 2007 and 47 per cent lower than the peak production level of 137 million tonnes in 1999. In 2008 about two-thirds of the United Kingdom's primary oil production was exported with imported crude oil accounting for about two-thirds of refinery intake. Feedstocks (including partly processed oils) made up 13 per cent of total imports of oil in 2008. Total primary oil imports in 2008 increased 5 per cent in comparison to 2007, while exports fell by 5 per cent to 48 million tonnes. Since 2005, the UK has returned to being a net-importer of primary oils, by 12 million tonnes in 2008. Exports in 2008 were 19 per cent lower than imports. In 2007 exports were 11 per cent lower. Further declines in exports and increases in imports will be seen as indigenous production continues to decline. Even so primary oil exports will continue to make a significant contribution to the UK economy (see Annex G on DECC's energy statistics web site).

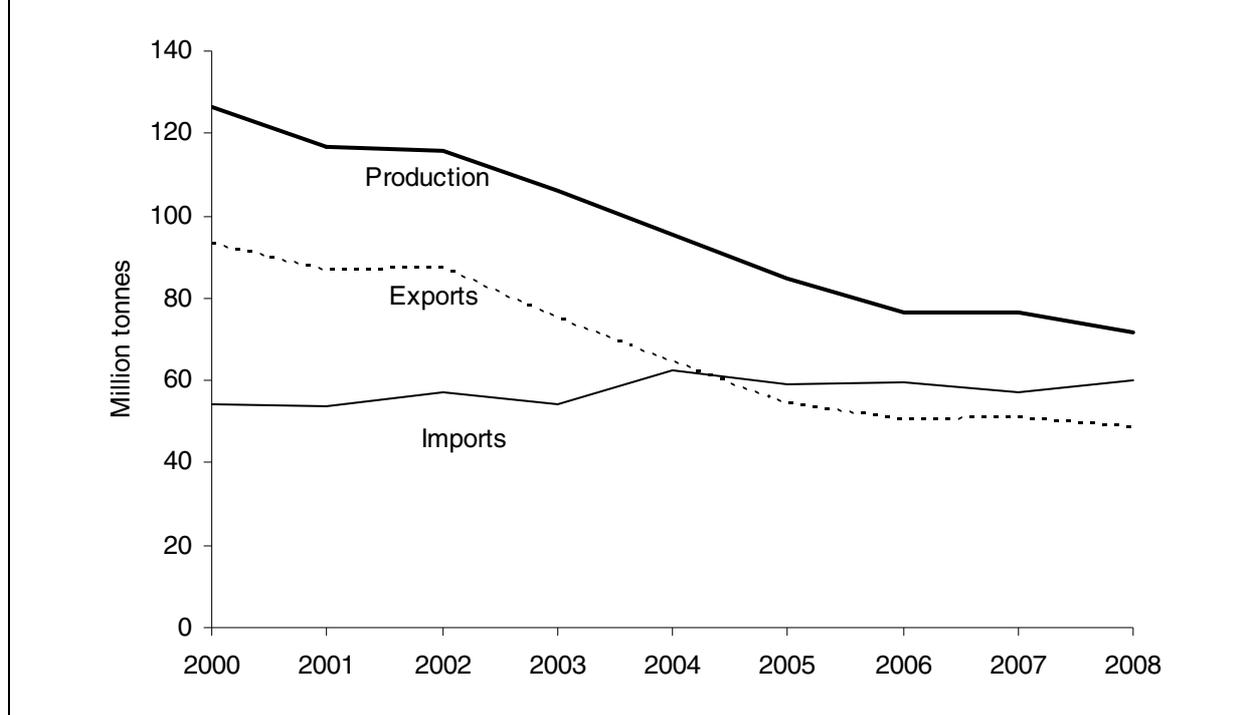
3.8 Production from the United Kingdom Continental Shelf peaked in 1999 but has been in general decline since. Chart 3.1 illustrates recent trends in production, imports and exports of crude oil, NGLs and feedstocks. It shows that crude oil exports have fallen in line with the decline in production whilst imports have risen gradually.

Petroleum Flow Chart 2008 (million tonnes)



Note: This flow chart is based on the data that appear in Tables 3.1 and 3.2.

Chart 3.1: Production, imports and exports of primary oils 2000 to 2008



3.9 The UK imports crude oil for various commercial reasons. Primarily refineries consider the type of crude oil rather than its source origin. Most UK refineries use North Sea ‘type’ crude and do not differentiate between the UK and Norwegian sectors of the North Sea. Indeed, some UK refiners have production interests in both UK and Norwegian waters so the company may own the imported crude at the point of production. The close proximity of some UK and Norwegian oil fields mean that they may use the same pipeline infrastructure, for example the Norpipe oil terminal in Teesside receives both UK and Norwegian crude from the North Sea. Some crude oils are specifically imported for the heavier hydrocarbons which they contain as these are needed for the manufacture of various petroleum products such as bitumen and lubricating oils. This is in contrast to most North Sea type crude which contains a higher proportion of the lighter hydrocarbon fuels resulting in higher yields of products such as motor spirit and other transport fuels.

3.10 The 2008 energy balance in Table 3.1 shows that the overall statistical difference in the primary oil balance is minus 91 thousand tonnes. This means that the total quantities of crude oil and NGLs reported as being produced by the individual UK production fields are 91 thousand tonnes (0.1 per cent) less than the totals reported by UK oil companies as being received by refineries or going for export. The reasons for this are discussed later in paragraphs 3.76 to 3.89 in the technical notes.

Commodity balances - Petroleum products (Tables 3.2 to 3.4)

3.11 These tables show details of the production, supply and disposals of petroleum products into the UK market in 2008, 2007 and 2006. The upper half of the table represents the supply side and calculates overall availability of the various products in the UK by combining production at refineries with trade (imports and exports), stock changes, product transfers and deliveries to international marine bunkers. The lower half of the table reports the demand side and covers the uses made of the differing products, including the uses made within refineries as fuels in the refining process, and details of the amounts reported by oil companies within the UK as delivered for final consumption.

Supply of petroleum products

3.12 Total petroleum products (gross) output from UK refineries in 2008 was 80 million tonnes, which was 1 per cent (0.8 million tonnes) lower than the level in 2007 and 3 per cent lower than the 2006 level. The fluctuations in refinery output have tended to result from routine maintenance work.

3.13 In terms of output of individual products, production of fuel oils fell by 0.5 million tonnes. This fall was partially offset by increased production of burning oil, up by 0.1 million tonnes, and gas/diesel oil,

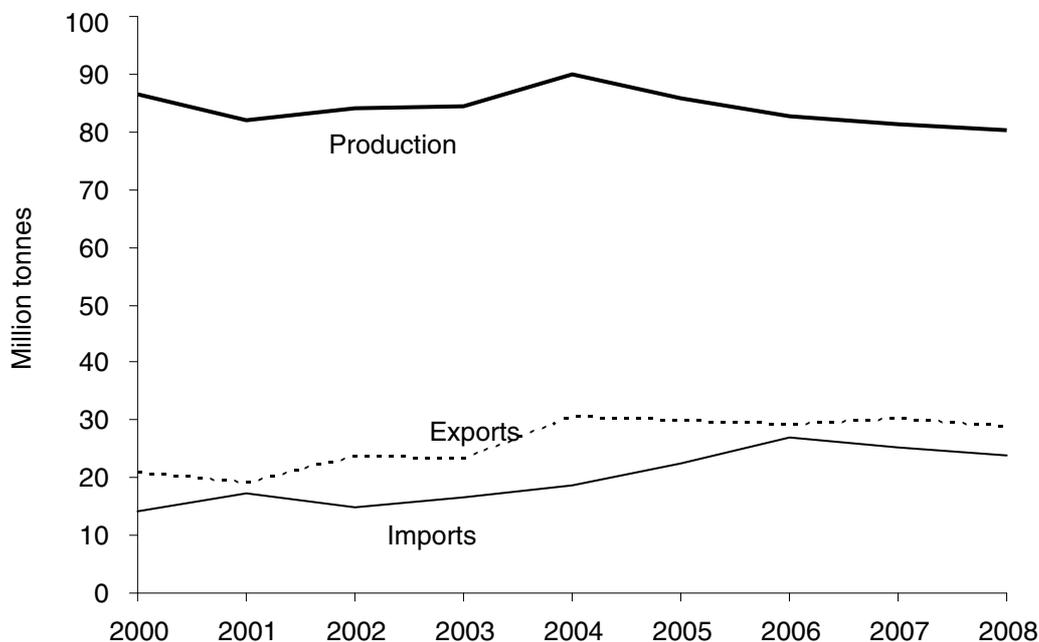
up by 0.6 million tonnes.

3.14 UK domestic production of individual petroleum products is increasingly no longer aligned with the domestic market demand. While the UK has surplus production of motor spirit and fuel oil, it produces insufficient aviation turbine fuel. Aviation turbine fuel and gas/diesel oil are extracted from the same fraction of crude oil (middle distillates), though to different quality criteria. Therefore, as the production of one increases there is less of this fraction of crude oil available for production of the other. More information on refinery capacity in the UK and refinery capacity utilisation is given in paragraphs 3.64 and 3.65.

Production, imports and exports of petroleum products

3.15 Chart 3.2 shows imports and exports of petroleum products along with production. Imports of products have followed a similar pattern to that of crude imports by steadily increasing. The UK is still a net exporter of petroleum products by 4 million tonnes in 2008 and refinery infrastructure suggests that exports will continue to be significant for sometime.

Chart 3.2: Production, imports and exports of petroleum products 2000 to 2008



3.16 The UK has been a net exporter of oil products every year since 1974, with the exception of 1984 due to the effects of the industrial action in the coal-mining sector. Exports of petroleum products were 29 million tonnes in 2008, 2 per cent lower than in 2007 and 1 per cent lower than in 2006. Imports of oil products into the UK were 24 million tonnes in 2008, which were 5 per cent lower than in 2007 and 11 per cent lower than in 2006. Overall, the UK net exports were 4 million tonnes in 2008, down from 6 million tonnes reported in 2007 and up from 2 million tonnes reported in 2006. Additional analysis of the exports and imports of oil products is given in the long term trends internet section (paragraphs 3.1.2-3.1.9) and additional details about trends in UK oil production are given in Annex F on DECC's energy statistics web site.

3.17 Differences in product types explain why the UK imports petroleum products when there is an overall surplus available for export. Exports in 2008 were mainly made up of motor spirit (7 million tonnes), gas/diesel oil (7 million tonnes) and fuel oil (7 million tonnes), whereas imports consisted of aviation turbine fuel (8 million tonnes), motor spirit (3 million tonnes) and gas/diesel oil (7 million tonnes). Imports take place to cover specific periods of heavy demand within the UK such as seasonally high demand or to cover production shortfalls in refinery shutdowns for maintenance.

3.18 For gas/diesel oil, exports from the UK tend to be of lower grades for use as heating fuels, while imports tend to be of higher-grade gas/diesel oil with a low sulphur content. With the introduction of low sulphur DERV fuel and motor spirit into the UK market and the required increased production capacity at UK refineries for these fuels, UK imports of these products increased to meet the shortfall. As noted above, aviation turbine fuel is imported simply because the UK cannot make enough of it to meet demand, since it is derived from the same sort of hydrocarbons as gas/diesel oil, and as such there is a physical limit to how much can be made from the amount of oil processed in the UK.

3.19 More information on the structure of refineries in the UK and trends in imports and exports of crude oil and oil products is given in the long-term trends section on DECC's energy statistics web site (Table 3.1.1).

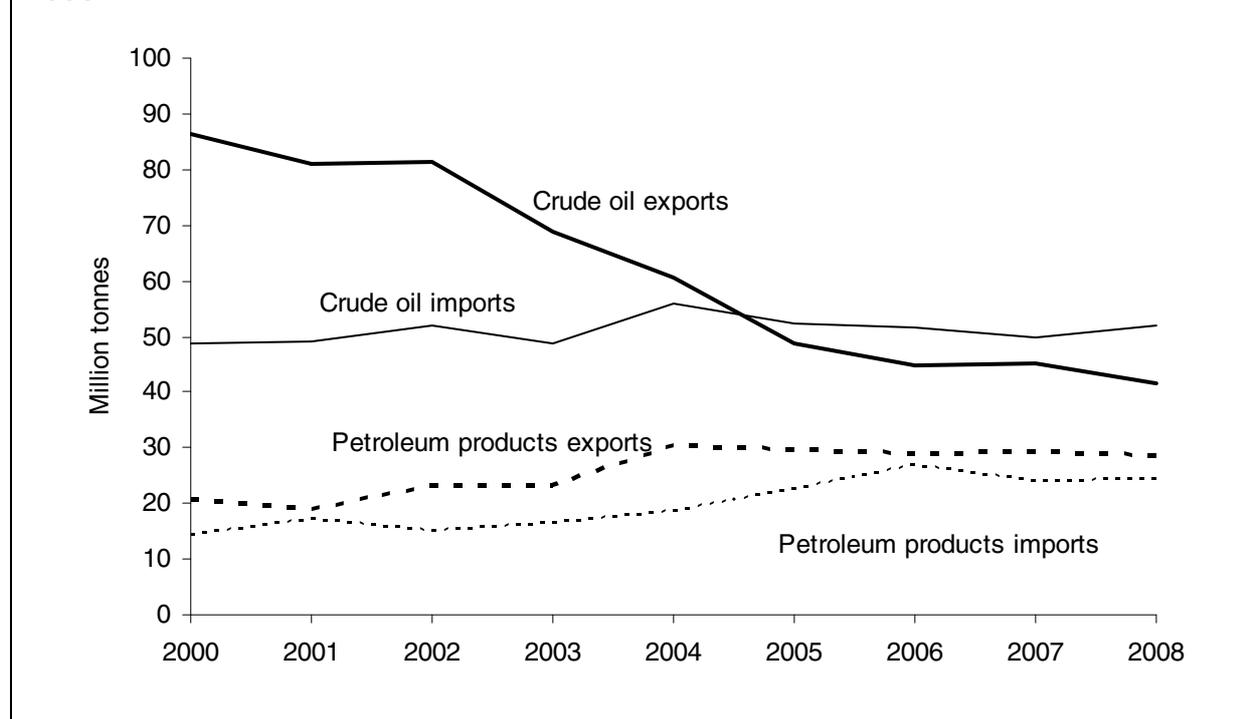
3.20 The United States remains one of the key markets for UK exports of oil products, with 20 per cent of total UK product exports destined to the US in 2008. Of the 5.9 million tonnes exported to the US in 2008, motor spirit comprised 92 per cent and accounted for 13 per cent by mass of total US motor spirit imports. The majority of UK product exports are however intra-EU, with the principal recipients in 2008 being the Netherlands, Ireland, Spain, France and Belgium. In 2008, the UK supplied 7 per cent of total US imports of all petroleum products and 12, 11 and 7 per cent respectively of total product imports into the Netherlands, Spain and France (mostly as gas oil for heating, motor spirit and fuel oil). In 2008, the UK supplied 90 per cent of total oil products imported into Ireland (principally motor spirit, jet kerosene and DERV fuel for transport, along with gas oil for heating). The main sources of the UK's imports of petroleum products in 2008 were the Netherlands, Sweden, France, Kuwait and Belgium (source: HM Revenue & Customs).

3.21 In 2008, 17 per cent of UK production of fuel oil and 3 per cent of gas oil/diesel production went into international marine bunkers, totalling 3 million tonnes of products; 3 per cent of the total UK refinery production in the year. These are fuel sales destined for consumption on ocean going vessels and therefore cannot be classified as being consumed within the UK. Correspondingly these quantities are treated in a similar way to exports in the commodity balances. It should be noted that these quantities do not include deliveries of fuels for use in UK coastal waters, which are counted as UK consumption and are given in the figures of the transport section of the commodity balances.

Overall oil net imports/exports

3.22 Chart 3.3 compares the level of imports and exports of crude oil with those for petroleum products over the period 2000 to 2008. The chart shows that in 2005 the UK became a net-importer of crude oil, which has continued into 2008 on a greater scale. For petroleum products, it can be seen that in 2008 the UK was a net-exporter but overall the UK was a net-importer in 2008, influenced mainly by the scale of crude oil imports.

Chart 3.3: Imports and exports of crude oil and petroleum products 2000 to 2008



3.23 Two articles have been published, in the March and June 2007 editions of Energy Trends, which look at this analysis in greater detail, taking some of the data back as far as 1870. The publications are available on the DECC website at www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx

Supply and disposal of products (Table 3.5)

3.24 Table 3.5 brings together the commodity balances for primary oils and for petroleum products into a single overall balance table. Bringing these data together highlights some of the issues faced when compiling these data and the need for a statistical difference, which is covered in paragraphs 3.76 to 3.89 in the technical notes. When looking at the transfers from upstream to downstream, a loss in the refining process is expected.

Consumption of petroleum products

3.25 Tables 3.2 to 3.4 show the consumption of oil products during the period 2006 to 2008, by consumers (going down the tables) and for individual products (going across the tables).

Consumption of petroleum products by product

3.26 Final consumption is dominated by three individual products; aviation turbine fuel, motor spirit and gas/diesel oil that between them made up 80 per cent of total final energy consumption in 2008. These three products are predominantly used as transport fuels although 11 per cent of gas oil is used by industry. More detail on transport fuels is given in paragraph 3.36 onwards.

3.27 In 2008 total final consumption of fuel oil was 1.6 million tonnes, up by 1 per cent on 2007. Further detail on the consumption of fuel oil broken down by grade is given in Table 3.6.

Consumption of petroleum products by sector

3.28 Deliveries of petroleum products into consumption in the UK in 2008 (shown in tables 3.2 to 3.4), including those used by the UK refining industry as fuels within the refining process and all other uses, totalled 76 million tonnes. This was 2 per cent lower than 2007 and 5 per cent lower than in 2006. Deliveries have declined in recent years, from a 2005 peak.

3.29 One of the changes in deliveries of products in recent years has been the decline in use for

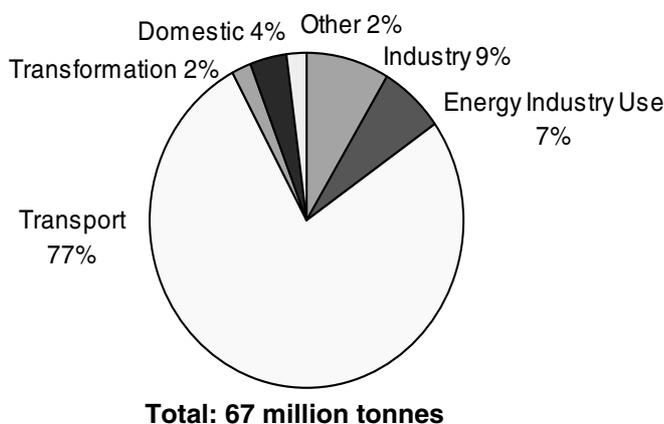
electricity generation. (See long term trends, Table 3.1.2 on DECC’s energy statistics web site). This change is primarily a result of major electricity producers using natural gas as their fuel of choice for electricity generation rather than oil-based fuels. This trend is also reflected in the declining level of usage by auto-producers of electricity over the period, despite the growth in auto-generation of electricity by industry as a whole, and in the significant declining use in heat generation. Figures in table 3.2 to 3.4 of fuel oil used for electricity generation differ to those in chapter 5 largely due to the difference between deliveries and consumption— see paragraph 3.76 onwards for more information.

3.30 The data included under the blast furnaces heading of the Transformation sector represents fuel oil used in the manufacture of iron and steel which is directly injected into blast furnaces, as opposed to being used as a fuel to heat the blast furnaces. The fuel used for the latter (mostly gas oil) is included under the blast furnaces heading of the Energy Industry Use sector.

3.31 Other figures in the Energy Industry Use sector relate to uses within the UK refining industry in the manufacture of oil products. These are products either used as fuels during refining processes or products used by the refineries themselves as opposed to being sold to other consumers. It excludes any fuels used for the generation of electricity since these amounts are included in the Transformation sector totals. Given the interest in the total amounts of fuels used within refineries, Table 3.5 includes data on total refinery fuel usage (i.e. including that used in the generation of electricity) over the period 2004 to 2008.

3.32 Final consumption of oil products in 2008, i.e. excluding any uses by the energy industries themselves or for transformation purposes, amounted to 70 million tonnes, 2 million tonnes less than 2007 and 3 million tonnes less than 2006. Chart 3.4 shows the breakdown of consumption for energy uses by each sector in 2008, including energy industry use and transformation, but excluding non energy use.

Chart 3.4: Petroleum products used for energy (share by main sector) 2008



3.33 Consumption of non-energy products decreased to just over 8 million tonnes in 2008, down by 2 per cent when compared to 2007, with non-energy products making up 12 per cent of final consumption of oil products. Additional detail on the non-energy uses of oil products, by product and by type of use where such information is available, is given in Table 3D and paragraphs 3.56 to 3.63 later in this text.

3.34 The total amount of oil products used by industry was in decline in the middle-1990s as industry moved away from using oil as an energy source. During the period 1998 to 2003 oil use by industry was fairly constant at around 5½ million tonnes. Since then industrial usage has grown to 6½ million tonnes in 2004 and remained at this level in 2005 and 2006. In 2007, it dropped slightly to 6.2 million tonnes, and to 5.8 million tonnes in 2008.

3.35 Transport sector consumption in 2006 and 2007 was virtually the same but was 3 per cent lower in 2008. The decrease in transport sector consumption has largely been driven by decreased use of DERV fuels that were down by 2 per cent in 2008 when compared to 2007. In contrast, final energy

consumption by sectors other than transport and industry increased by 2 per cent in 2008 compared with 2007. Changes in the consumption of fuels in transport are discussed in more detail below.

Transport fuels - information on inland deliveries of motor spirit and DERV (Table 3.6)

3.36 Table 3.6 provides details for consumption of motor spirit, gas oil/diesel and fuel oils given in the main commodity balance tables for the period 2004 to 2008. It includes information on retail and commercial deliveries of motor spirit and DERV fuel that cannot be accommodated within the structure of the commodity balances, but which are of interest. The table also includes additional details of the quantities of motor spirit and DERV fuel sold collectively by super/hypermarket companies in the UK.

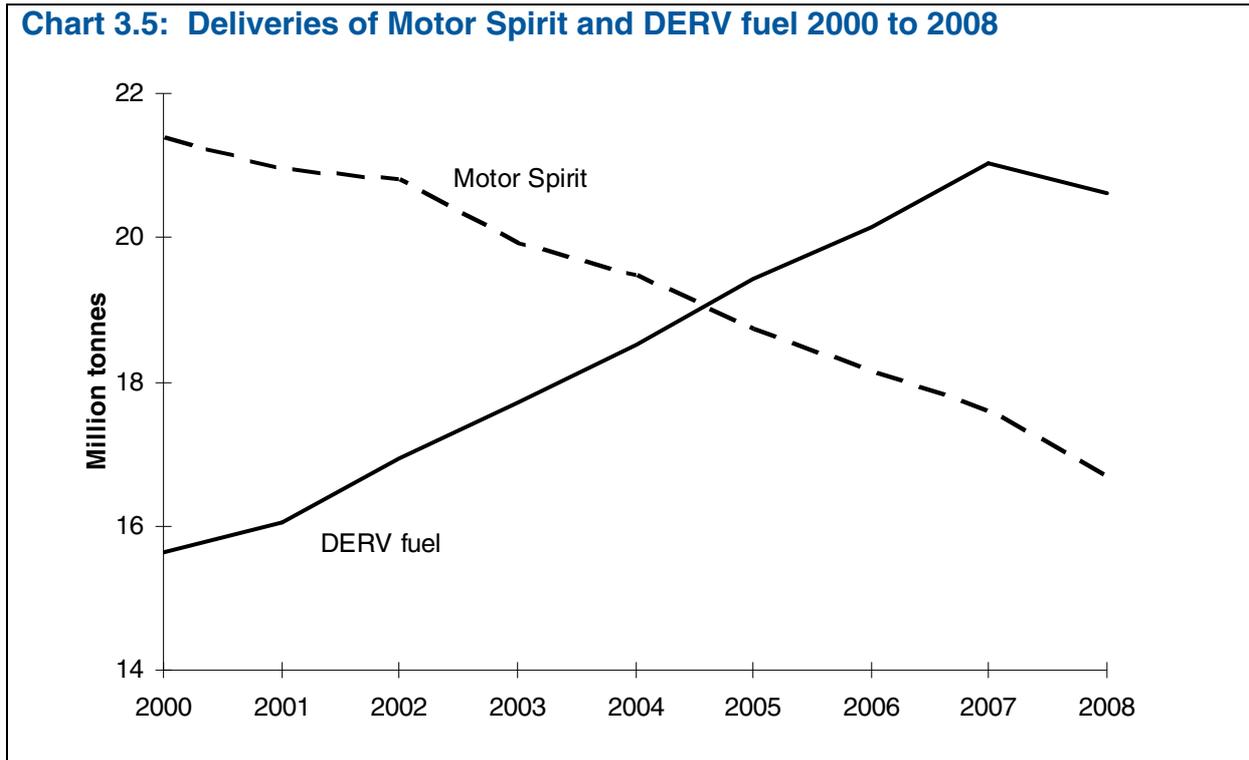
3.37 This table no longer provides separate breakdowns for lead replacement and super premium unleaded petrol. The demand for lead replacement petrol has fallen sharply over the last ten years with people switching to premium unleaded. Additionally, the remaining demand for petrol with a higher octane rating has moved away from lead replacement to super premium unleaded, a more advanced fuel. Demand for lead replacement petrol fell to less than 10 thousand tonnes in 2007 and so for simplicity lead replacement and super premium unleaded have been combined. Biofuels are now covered in paragraphs 3.48 to 3.50 and Table 3B.

3.38 Motor spirit deliveries in 2008 were 5 per cent down compared to 2007 and 8 per cent lower than in 2006. In contrast, deliveries of DERV fuel were 2 per cent lower in 2008 compared to 2007, and 2 per cent higher than in 2006. The differing trends of continued decline in motor spirit deliveries and rising DERV deliveries led to DERV deliveries surpassing motor spirit for the first time in 2005 in terms of weight, which continued into 2007. However, for the first time in 2007 DERV deliveries surpassed motor spirit in terms of both weight and volume. The decrease in DERV relates to the inclusion of biodiesel and the RTFO (see paragraphs 3.48 to 3.50). With the inclusion of biodiesel, total DERV increased modestly in 2008.

3.39 Chart 3.5 shows how consumption of DERV fuel has steadily increased from 2000 to surpass deliveries of motor spirit in 2005 in weight terms. This is a result of a long-term shift to diesel engine vehicles. DERV is denser than motor spirit so the total weight of deliveries surpassed the weight of motor spirit deliveries before the volume did. The chart also shows the reduction in the consumption of motor spirit in the UK, which has been an overall downward trend since 1990. Consumption of motor spirit in 2008 was 30 per cent lower than the peak of 24 million tonnes in 1990.

3.40 One feature of Chart 3.5 is the reduction in diesel deliveries in 2008. There are a number of reasons for this, including the reduction in commercial use (see Table 3.6), largely brought about by lower economic performance of the UK economy; the use of biofuels; and the high prices seen in early summer 2008. The Department of Transport's Road Traffic Statistics 2008 showed a decrease in car, light van and heavy goods vehicle traffic between 2007 and 2008.

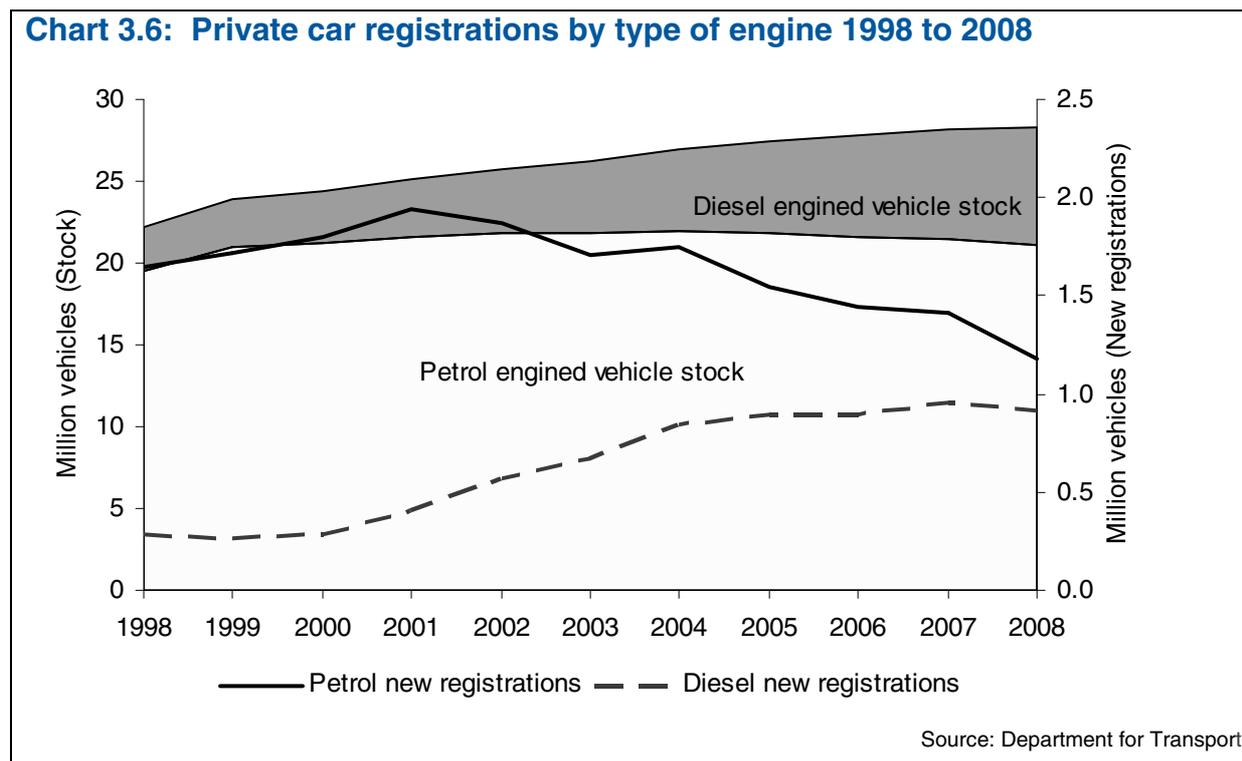
Chart 3.5: Deliveries of Motor Spirit and DERV fuel 2000 to 2008



3.41 Several factors are behind the differing trends seen for motor spirit and DERV fuel. For a number of years, the number of diesel-engined vehicles in use in the UK has been increasing. Diesel vehicles are more fuel-efficient than their petrol equivalents. In the National Travel Survey carried out by the Department for Transport, diesel-engined cars averaged 39 miles per gallon of fuel, compared with 31 miles per gallon for petrol-engined cars. Traditionally the greater fuel-efficiency of diesel vehicles had been at the expense of higher purchase prices and a performance deficit when compared to petrol-engined equivalents. More recently, the purchase prices for diesel and petrol engined vehicles have become more alike, while improved technology has substantially reduced the performance deficit.

3.42 Chart 3.6 illustrates the switch from petrol to diesel engines in terms of vehicle licence registrations based on DVLA data. It contains details of vehicle licence registrations for private cars during each year for the period 1998 to 2008, broken down by type of engine. Whilst the number of petrol engined vehicles licensed only grew by 8 per cent, the number of diesel engined vehicles licensed has increased 168 per cent in the same period. Petrol engined vehicle stock remains greater than diesel however their share has decreased from 88 per cent in 1998 to 74 per cent in 2008.

Chart 3.6: Private car registrations by type of engine 1998 to 2008



Source: Department for Transport

3.43 The chart also shows new registrations for petrol and diesel cars. Although more new petrol cars are registered each year than diesel, registrations for new petrol cars peaked in 2001 and have declined since in contrast to registrations for new diesel cars that have increased since 2000. As the actual number of petrol engine vehicles on the road is relatively flat, new registrations are simply replacing losses. This turnover in the vehicle stock would suggest that the average fuel efficiency of the UK petrol vehicle stock would improve as newer vehicles tend to be more fuel efficient due to improved technology. This is supported by a comparison of the static petrol car population in chart 3.6 with the steady decline of motor spirit consumption illustrated in chart 3.5.

3.44 As part of their work to compile the UK emissions inventory, AEA Energy and Environment has constructed estimates for the consumption of road transport fuels by different vehicle classes, and these are shown in Table 3A. The table shows the increasing share of DERV used by cars and light goods vehicles (vans).

Table 3A Estimated consumption of road transport fuels by vehicle class

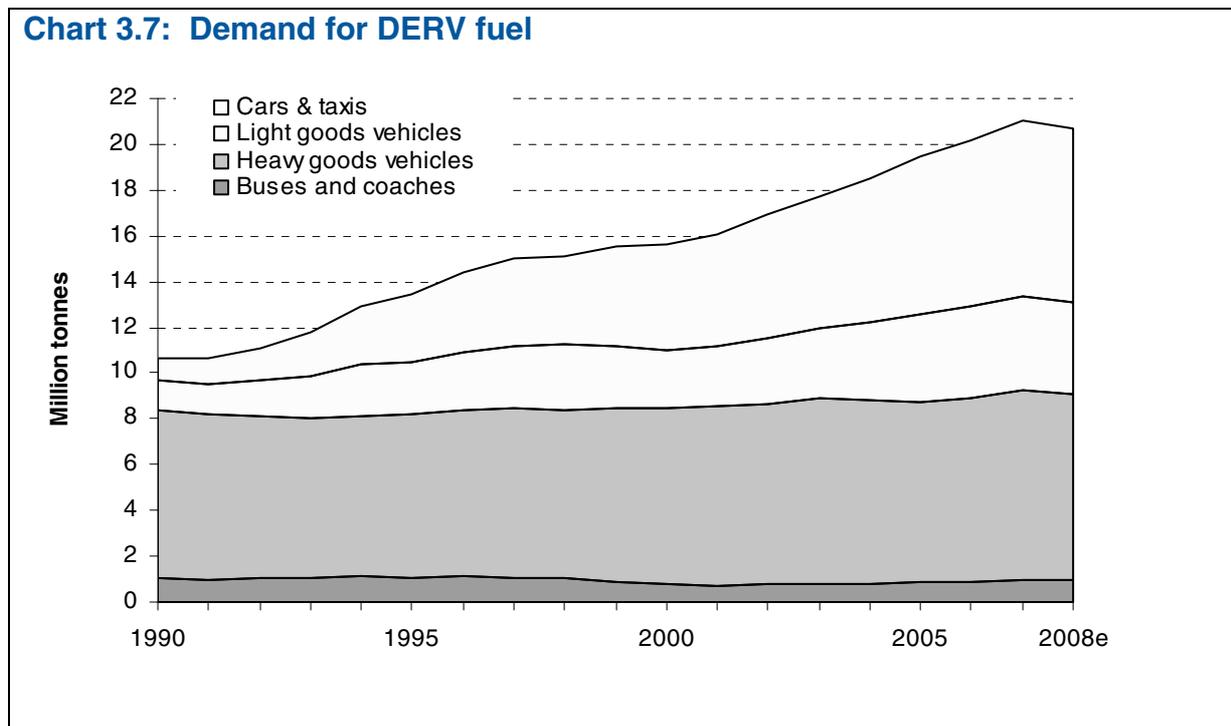
	1990	1995	2000	2007
Motor spirit:				
Cars and taxis	90%	92%	94%	95%
Light goods vehicles	8%	7%	4%	2%
Motor cycles etc	2%	2%	2%	2%
DERV:				
Cars and taxis	9%	22%	30%	36%
Light goods vehicles	12%	17%	17%	20%
Heavy goods vehicles	69%	53%	49%	39%
Buses and coaches	10%	8%	5%	5%

Source: AEA Energy and Environment

3.45 Chart 3.7 illustrates how demand for DERV fuel has increased since 1990. The most significant increase has been for use in cars and taxis, a seven-fold rise since 1990 and their share of overall DERV demand being 4 times that of 1990. DERV consumption in goods vehicles (both light and heavy) has also increased. Bus and coach use has remained flat at around 1 million tonnes a year, meaning their share of demand has decreased.

3.46 In 2008, AEA revised their methodology for calculating the split of DERV demand between vehicle types. The time series in Chart 3.7 has been revised to reflect this. The change was due to a survey by the Department for Transport (National Travel Survey 2006, www.dft.gov.uk/pgr/statistics/datatablespublications/personal/mainresults/nts2006/) showing that diesel cars tend to have higher mileage than petrol cars. Previously the split had been made simply using vehicle licensing statistics. In order to keep total DERV consumption consistent with published DECC figures, the proportion of DERV demand by goods vehicles, buses and coaches has been revised downwards.

Chart 3.7: Demand for DERV fuel



3.47 Tables 3.2 to 3.4 include estimates for the use of gas for road vehicles. These estimates were based on information on the amounts of duty received by HM Revenue and Customs from the tax on gas used as a road fuel. It is estimated that some 125 thousand tonnes of gas (mostly butane or propane) was used in road vehicles in the UK in 2008. Although this is a very small use when compared to overall consumption of these fuels and the total consumption of fuels for road transport, the consumption of these gases for road transport grew rapidly until 2003, but has since remained broadly flat.

Biofuels

3.48 Information regarding biofuels has previously not been included in the commodity balances or the supplementary tables because information has been limited. Biofuels are not included in tables in this chapter, but are included in overall energy balances in Chapter 1. HM Revenue and Customs has the best available information covering duty clearances or volumes on which excise duty has been paid that effectively equate to the deliveries reported in this chapter. Biodiesel clearances began in 2002 with bioethanol clearances commencing in 2005. The amounts reported are very small in comparison with overall DERV and petrol deliveries but have been increasing rapidly. Note that table 3B is based entirely on HMRC excise data and that there are small mismatches between the DERV and motor spirit volumes produced that are reported in the main tables in chapter 3.

3.49 Table 3B shows biofuel clearances since they began in 2002. In 2008 biodiesel clearances were 886 million litres (up 155 per cent from 2007), while bioethanol clearances were 206 million litres (up by 36 per cent). Biodiesel represented 3.5 per cent of the total DERV delivered in the calendar year 2008, bioethanol represented 0.9 per cent of the total motor spirit and overall, biofuels represented 2.3 per cent of the total road fuels.

Table 3B: Consumption of Biodiesel and Bioethanol in the UK

Unit: Million litres

Year	Biodiesel	DERV	Biodiesel as % Diesel share	Bioethanol	Motor Spirit	Bioethanol as % Motor Spirit share
2002	2	19,767	0.01%	0	28,002	0.00%
2003	19	20,906	0.09%	0	27,393	0.00%
2004	21	22,181	0.09%	0	27,025	0.00%
2005	33	23,233	0.14%	85	25,608	0.33%
2006	169	24,286	0.70%	95	24,672	0.39%
2007	347	25,476	1.36%	152	24,045	0.64%
2008	886	25,686	3.45%	206	22,709	0.91%

Source: HM Revenue and Customs

3.50 The UK has an obligation to increase the level of biofuels in road transport to 5 per cent by 2013/14. Further information about biofuels and the Renewable Transport Fuel Obligation (RTFO) can be found in paragraphs 7.24 to 7.28 and www.renewablefuelsagency.org/abouttherfa.cfm

Super/hypermarket share

3.51 Volumes of motor spirit sold by super/hypermarkets decreased by 3 per cent from 2007 whilst their DERV deliveries increased by 6 per cent. Sales by super/hypermarkets have taken an increasing share of retail deliveries (i.e. deliveries to dealers) of motor spirit and DERV fuel in recent years as Table 3C shows. The share of total deliveries (i.e. including deliveries direct to commercial consumers) is shown in the second column.

Table 3C Super/hypermarkets share of retail deliveries, 2004 to 2008

per cent

	Motor spirit		DERV fuel	
	Share of retail	Share of total	Share of retail	Share of total
2004	33	32	26	13
2005	38	36	29	16
2006	41	39	34	19
2007	39	37	34	20
2008	39	38	34	21

3.52 The increases seen in recent years represent an increase in sales by super/hypermarket companies, although the percentage shares are also affected by the decline in the overall deliveries of motor spirit in the UK seen in these years as mentioned earlier.

Transport fuels - aviation

3.53 Data in Tables 3.2 to 3.4 show the changing amounts of aviation turbine fuel (ATF) kerosene being consumed in the UK between 2006 and 2008. The long-term trends section on the internet discusses the trend seen since 1970 in the use of ATF kerosene in the UK. Overall, deliveries in 2008 were 4 per cent lower than 2007 and 2006.

3.54 Chart 3.8 shows annual deliveries of ATF kerosene in the UK over the last decade. ATF consumption increased steadily until 1997 and then rapidly until 2000. The September 11th terrorist attacks on the United States had a significant impact on the global aviation industry and reversed the trend for a period lasting more than twelve months. The increase in ATF deliveries since 2002 illustrates the subsequent recovery of the global aviation industry.

Chart 3.8: Aviation Turbine Fuel deliveries over the last decade

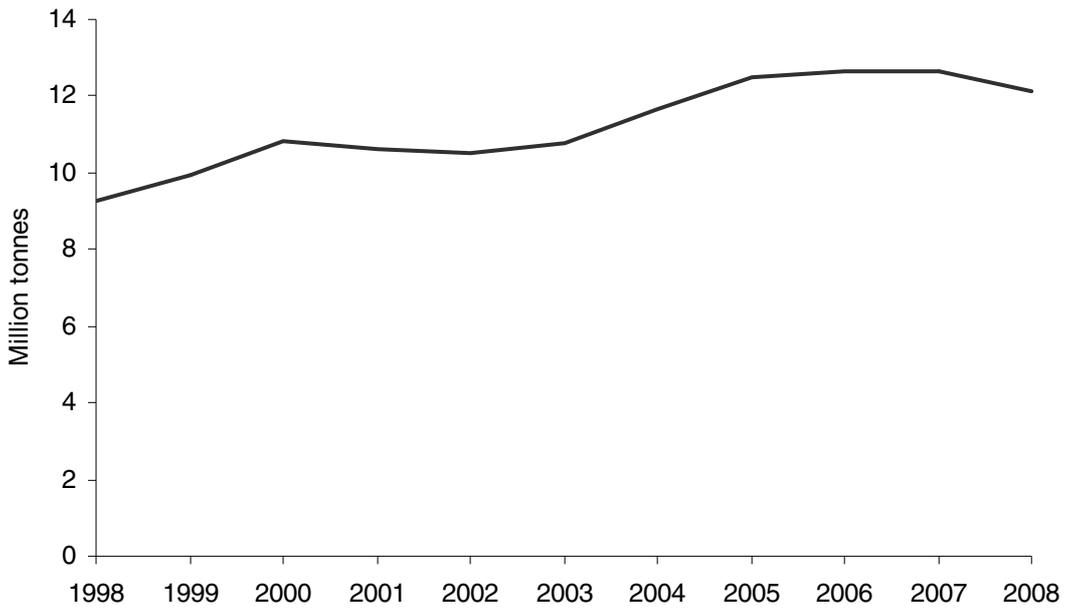
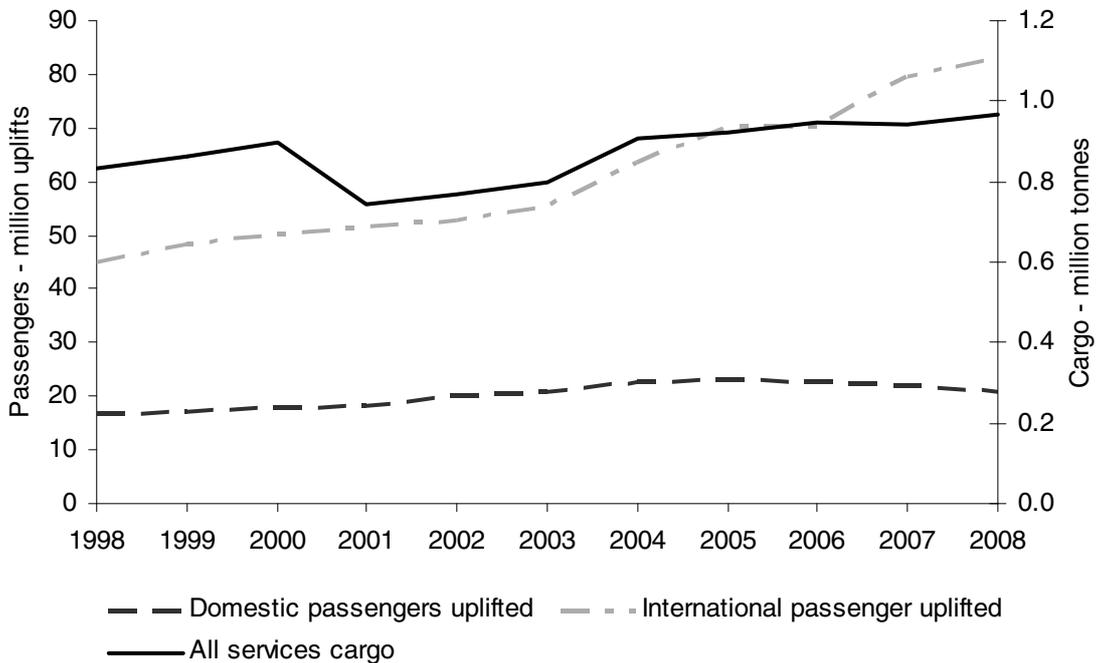


Chart 3.9: Aviation Turbine Fuel usage over the last decade by type



3.55 Chart 3.9 shows the aviation industry’s activities over the last ten years split by the domestic and international passenger uplifts and cargo delivery categories. It is clear to see that the events of September 11th 2001 had varied effects on the different sections of the industry. International air passenger movements suffered a fall in the rate of growth, while domestic flights appear to be largely unaffected. The most significant effect however is clearly visible within the cargo division of the industry, which saw a fall of 21 per cent in 2001. The differing ways in which the demand for the industry’s separate services reacted to the terrorist attack implies that rather than causing a reluctance of passengers in the UK to fly, the negative effect on the economy, causing cargo demand to fall, had the greatest impact. Since 2001, cargo use has steadily grown and in 2008 was slightly higher than

the level seen in 2000.

Inland deliveries for non-energy uses

3.56 Table 3D below summarises additional data on the non-energy uses made of the total deliveries of oil products included as the bottom line in the commodity balances in Tables 3.2 to 3.4. It provides extra information on the uses of lubricating oils and greases by use, and details of products used as petro-chemical feedstocks.

Table 3D: Additional information on inland deliveries for non-energy uses, 2006 to 2008

Thousand tonnes			
	2006	2007	2008
Feedstock for petroleum chemical plants:			
Propane	994	811r	1,192
Butane	737	717	870
Other gases	1,648	1,514	1,458
Total gases	3,379	3,042r	3,520
Naphtha (LDF)	2,278	1,947r	848
Middle Distillate Feedstock (MDF)	258	239	239
Other products	-	-	-
Total feedstock	5,915	5,228r	4,607
Lubricating oils and grease:			
Aviation	5	4	3
Industrial	478	450	342
Marine	26	24	18
Motors	200	189	143
Agricultural	5	5	4
Fuel oil sold as lubricant	-	-	-
Total lubricating oils and grease	713	672	510
Other non-energy products:			
Industrial spirit/white spirit	156	167	145
Bitumen	1,610	1,563r	1,741
Petroleum wax	48	39	46
Petroleum coke	925	544	928
Miscellaneous products	628	419r	544
Total non-energy use	9,995	8,631r	8,483

3.57 All inland deliveries of lubricating oils and petroleum coke have been classified as non-energy use only. However, some deliveries are used for energy purposes but it is difficult to estimate energy use figures for these products with any degree of accuracy, hence no such estimates appear in the commodity balance tables.

3.58 For lubricating oils, about 50-55 per cent of inland deliveries each year are consumed during use (e.g. burnt within engines), or lost as a film on manufactured goods, lost due to evaporation, or for products like process oils and white oils, the oil becomes part of the product. During 2007 the Court of Appeal ruled that a non waste status fuel can be produced from waste oil subject to certain conditions being met. As a result, post use oil is reprocessed for several industrial uses, for example as a chemical for steel making, and some is burnt locally in licensed and unlicensed small space heaters. However, the split for each of these is unclear. Previous studies have shown that the UK's 85 per cent collection rate of used lubricating oils was one of the highest in Europe, but the changes to legislation

will make estimating this figure more difficult for some time.

3.59 In 2008 there was a fall of 54 per cent for inland deliveries of naphtha. There was decrease of 63 per cent in naphtha imports in 2008 when compared with 2007. Naphtha has become less profitable to produce and a contraction in the petrochemical sector has led to a decrease in demand.

3.60 For petroleum coke, more information is available allowing more accurate estimates to be made. It has been possible to analyse the data available for the imports of petroleum coke to identify which type of company is importing the product. This work has shown that a significant proportion of petroleum coke imports each year are made by energy companies, such as power generators or fuels merchants, with another substantial proportion being imported by cement manufacturers. Whilst it cannot be certain that these imports are being used as a fuel, information on the use of petroleum coke in cement manufacture suggests that it is, and as a result petroleum coke data are included in the commodity balances.

3.61 Using imports data, estimates have been constructed which show that around 0.9 million tonnes of petroleum coke were imported for inland deliveries in 2008. Provisional estimates indicate that at least half of that amount is employed for energy uses (for electricity generation, use as a fuel in the manufacture of cement, sold as a solid fuel or to be used in the manufacture of other solid fuels) with the remainder being used in the petro-chemical and manufacturing industries.

3.62 Analysis of the data on the quantity and value of imports of petroleum coke into the UK from HM Revenue and Customs provides some estimates for the cost of imports and gives some indication of the prices being paid. These are only indicative of the prices being paid in the port of importation, and do not include the extra transport costs from the port to the final destination that would be part of more rigorous price estimate. Details of these estimates are included in Annex G on trade in fuels, as part of Table G.3 on the DECC energy statistics web site. A breakdown has been made by grade of petroleum coke and type of use for imports into the UK, which is given in Table 3E below. Calcined petroleum coke is virtually pure carbon, and as such is more valuable than non-calcined (otherwise known as “green”) petroleum coke, as shown by the higher price per tonne it commands and the fact that it is not used simply as a fuel.

Table 3E Estimated £ per tonne for imports of petroleum coke into the UK

	Non-calcined (“green”) petroleum coke			Calcined petroleum coke
	Energy	Non-energy	Total	Non-energy
2005	30.8	35.3	32.9	131.1
2006	35.7	54.8	42.2	138.7
2007	43.2	49.5	47.5	137.0
2008	64.0	81.5	72.4	224.6

3.63 Petroleum coke is a relatively low energy content fuel, having a calorific value of 35.8 GJ per tonne, compared with an average for petroleum products of 46.1 GJ per tonne, and 43.6 GJ per tonne for fuel oil. It is however higher than coal (26.1 GJ per tonne) and in certain areas is competing with coal as a fuel. It has the advantage of being a very cheap fuel, since it is often regarded as a waste product rather than a specific output from the refining process.

Refinery capacity

3.64 Data for refinery capacity as at the end of 2008 are presented in Table 3F, with the location of these refineries illustrated in Map 3A. These figures are collected annually by DECC from individual oil companies. Capacity per annum for each refinery is derived by applying the rated capacity of the plant per day when on-stream by the number of days the plant was on stream during the year. Fluctuations in the number of days the refinery is active are usually the main reasons for annual changes in the level of capacity. Reforming capacity covers catalytic reforming, and cracking/conversion capacity covers processes for upgrading residual oils to lighter products, e.g. catalytic, thermal or hydro-cracking, visbreaking and coking.

Table 3F: UK refinery processing capacity as at end 2008 ⁽¹⁾

(Symbols relate to Map 3A)	Million tonnes per annum		
	Distillation	Reforming	Cracking and Conversion
① Stanlow – Shell UK Ltd	11.5	1.5	3.8
② Fawley – ExxonMobil Co. Ltd	16.7	3.0	5.2
③ Coryton – Petroplus International Ltd	8.8	1.8	3.4
④ Grangemouth – Ineos Refining Ltd	9.8	2.0	3.3
⑤ Lindsey Oil Refinery Ltd – Total (UK)	10.9	1.5	4.1
⑥ Pembroke – Chevron Ltd	10.1	1.5	6.1
⑦ Killingholme – ConocoPhillips UK	10.2	2.2	9.2
⑧ Milford Haven - Murco Pet. Ltd	5.1	0.8	1.9
⑨ North Tees – Petroplus International Ltd	5.7	-	-
⑩ Harwich – Petrochem Carless Ltd	0.4	-	-
⑪ Eastham – Eastham Refinery Ltd	1.1	-	-
⑫ Dundee (Camperdown) – Nynas UK AB	0.7	-	-
Total all refineries	91.0	14.3	37.0

(1) Rated design capacity per day on stream multiplied by the average number of days on stream.

Map 3A: Distribution of UK refineries active as at end 2008

Symbols relate to refinery details given in Table 3F



3.65 At the end of 2008 the UK had 9 major refineries operating, with three minor refineries in existence. Distillation capacity in the UK at the end of 2008 was 91 million tonnes, 0.3 million tonnes higher than at the end of 2007. Total UK reforming capacity at the end of 2008 was 14.3 million tonnes, 0.1 million tonnes higher than 2007, while cracking and conversion capacity was 0.1 million tonnes lower at 37 million tonnes.

Inland deliveries by country

3.66 Over recent years DECC has been developing more detailed information on regional consumption data, which can be found at www.decc.gov.uk/en/content/cms/statistics/regional/regional.aspx. Although this information is one year in arrears it is thought to be more comprehensive than the information previously provided in this chapter.

Stocks of oil (Table 3.7)

3.67 This table shows stocks of crude oil, feedstocks (including partly processed oils) and products (in detail) at the end of each year. Details are given of stocks of products held within the UK either at refineries or oil distribution centres such as coastal oil terminals (undistributed stocks). However, these figures exclude any details of stocks held by distributors of fuels or stocks held at retail sites, such as petrol stations. The figures for stocks in the balances also solely relate to those stocks currently present in the UK and specifically exclude any stocks that might be held by UK oil companies in other countries under bilateral agreements. Stocks of crude oil and feedstocks decreased in 2008, with decreases in stocks held at terminals and refineries.

3.68 The UK holds emergency stocks of oil to help reduce the adverse impact on the UK of any disruptions of supplies of oil arising from domestic or international incidents. EU legislation (EC Directive 2006/07) requires EU member states to hold oil stocks equivalent to 90 days worth of average daily consumption calculated from the previous calendar year. These stocks are held to deal with oil supply emergencies, not to manage or affect prices. The UK, as a producer, receives a derogation of 25 per cent on its obligation and is only required to hold stocks equivalent to 67½ days of consumption.

3.69 The International Energy Agency (IEA) also requires its members to hold stocks for use in the event of global disruption. Until 2007 the United Kingdom as a net exporter was exempt from this requirement. However, in 2006 the United Kingdom became a net importer and so since 2007 has had an IEA obligation to hold stocks as well as its EU obligation. The same stocks count towards meeting both sets of obligations, and as IEA obligations are based on net imports we do not expect a significant net increase in total UK obligations until about 2016 – 2018.

3.70 To meet these obligations the UK Government requires companies supplying oil products into the UK market (production + net imports) to maintain a certain level of emergency stocks of oil products as fuels. As part of this, oil companies are allowed to hold stocks in other EU countries subject to bilateral agreements between Governments, and count these stocks towards their stocking obligations. The stock figures in Table 3.7 take account of these stocks to give a true picture of the amount of stocks available to the UK.

3.71 Stocks of petroleum products at the end of 2008 were 17 per cent higher than a year earlier. This was mostly due to the fact that net stocks held overseas on behalf of the UK more than doubled during the period. However, stocks of gas/diesel oil and motor spirit held in the UK have remained unchanged. The total stocks of crude oil and products held by UK companies at the end of 2008 were equivalent to approximately 84 days of UK consumption.

Technical notes and definitions

3.72 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1, paragraphs 1.26 to 1.60. For notes on the commodity balances and definitions of the terms used in the row headings see the Annex A, paragraphs A.7 to A.42. While the data in the printed and bound copy of this Digest cover only the most recent 7 years, these notes also cover data for earlier years that are available on the DECC web site.

Indigenous production

3.73 The term indigenous is used throughout this chapter and includes oil from the UK Continental Shelf both offshore and onshore.

Deliveries

3.74 These are deliveries into consumption, as opposed to being estimates of actual consumption or use. They are split between inland deliveries and deliveries to marine bunkers. Inland deliveries will not necessarily be consumed in the United Kingdom (e.g. aviation fuels).

Sources of data

3.75 The majority of the data included in the text and tables of this chapter are derived from DECC's Downstream Oil Reporting System (DORS), which replaced the UK Petroleum Industry Association (UKPIA) reporting system in 2005. Data relating to the inland operations of the UK oil industry (i.e. information on the supply, refining and distribution of oil in the UK) are collected from companies. The data format and coverage have been designed to meet most of the needs of both Government and the industry itself. Each member of UKPIA and a number of other contributing companies provides returns on its refining activities and deliveries of various products to the internal UK market. This information is supplemented whenever necessary to allow for complete coverage within the statistics, with separate exercises carried out on special topics (for example, the work on super/hypermarkets referred to in paragraph 3.52) or with the use of additional data (such as trade data from HM Customs and Revenue to cover import activity by non-reporting companies).

Statistical differences

3.76 In Tables 3.1 to 3.5, there are headings titled "statistical differences". These are differences between the separately observed figures for production and delivery of crude oil and products during the path of their movement from the point of production to the point of consumption.

3.77 The statistical differences headings listed in the primary oil commodity balances (Tables 3.1) are differences between the separately observed and reported figures for production from onshore or offshore fields and supply to the UK market that cannot be accounted for by any specific factors. Primarily they result from inaccuracies in the meters at various points along offshore pipelines. These meters vary slightly in their accuracy within accepted tolerances, giving rise to both losses and gains when the volumes of oil flowing are measured. Errors may also occur when non-standard conditions are used to meter the oil flow.

3.78 The statistical difference for primary oils in the table includes own use in onshore terminals and gas separation plants, losses, platform and other field stock changes. Another factor is the time lag that can exist between production and loading onto tankers being reported at an offshore field and the arrival of these tankers at onshore refineries and oil terminals. This gap is usually minimal and works such that any effect of this at the start of a month is balanced by a similar counterpart effect at the end of a month. However, there can be instances where the length of this interval is considerable and, if it happens at the end of a year, there can be significant effects on the statistical differences seen for the years involved.

3.79 Another technical factor that can contribute to the statistical differences relates to the recording of quantities at the producing field (which is the input for the production data) and at oil terminals and refineries, since they are in effect measuring different types of oil. Terminals and refineries are able to measure a standardised, stabilised crude oil, that is, with its water content and content of NGLs at a standard level and with the amounts being measured at standard conditions. However, at the producing field they are dealing with a "live" crude oil that can have a varying level of water and NGLs within it. While offshore companies report live crude at field, the disposals from oil terminals and offshore loading fields are reported as stabilised crude oil. This effectively assumes that terminal

disposals are stabilised crude production figures. These changes were introduced in the 2002 edition of this Digest.

3.80 Part of the overall statistical difference may also be due to problems with the correct reporting of individual NGLs at the production site and at terminals and refineries. It is known that there is some mixing of condensate and other NGLs in with what might otherwise be stabilised crude oil before it enters the pipeline. This mixing occurs as it removes the need for separate pipeline systems for transporting the NGLs and it also allows the viscosity of the oil passing down the pipeline to be varied as necessary. While the quantity figures recorded by terminals are in terms of stabilised crude oil, with the NGL component removed, there may be situations where what is being reported does not comply with this requirement.

3.81 With the downstream sector, the statistical differences can similarly be used to assess the validity and consistency of the data. From the tables, these differences are generally a very small proportion of the totals involved

3.82 Refinery data are collated from details of individual shipments received and made by each refinery and terminal operating company. Each year there are thousands of such shipments, which may be reported separately by two or three different companies involved in the movement. While intensive work is carried out to check these returns, it is possible that some double counting of receipts may occur.

3.83 Temperature, pressure and natural leakage also contribute to the statistical differences. In addition, small discrepancies can occur between the estimated calorific values used at the field and the more accurate values measured at the onshore terminal where data are shown on an energy basis. The statistical differences can also be affected by rounding, clerical errors or unrecorded losses, such as leakage. Other contributory factors are inaccuracies in the reporting of the amounts being disposed of to the various activities listed, including differences between the quantities reported as going to refineries and the actual amounts passing through refineries.

3.84 Similarly, the data under the statistical difference headings in Tables 3.2 to 3.4 are the differences between the deliveries of petroleum products to the inland UK market reported by the supplying companies and estimates for such deliveries. These estimates are calculated by taking the output of products reported by refineries and then adjusting it by the relevant factors (such as imports and exports of the products, changes in the levels of stocks etc.).

3.85 It may be thought that such differences should not exist as the data underlying both the observed deliveries into the UK market and the individual components of the estimates (i.e. production, imports, exports, stocks) come from the same source (the oil companies). While it is true that each oil company provides data on its own activities in each area, there are separate areas of operation within the companies that report their own part of the overall data. Table 3F below illustrates this.

Table 3G Sources of data within oil companies

Area covered	Source
Refinery production	Refinery
Imports and exports	Refinery, logistics departments, oil traders
Stocks	Refinery, crude and product terminals, major storage and distribution sites
Final deliveries	Sales, marketing and accounts departments

3.86 Each individual reporting source will have direct knowledge of its own data. For example, refineries will know what they produce and how much leaves the refinery gate as part of routine monitoring of the refinery operations. Similarly other data such as sales to final consumers or imports and exports will be closely monitored. Companies will ensure that each component set of data reported is as accurate as possible but their reporting systems may not be integrated, meaning that internal consistency checks across all reported data cannot be made. Each part of a company may also work to different timings as well, which may further add to the degree of differences seen.

3.87 The main area where there is known to be a problem is with the “Transfers” heading in the commodity balances. The data reported under this heading have two components. Firstly, there is an

allowance for reclassification of products within the refining process. For example, butane can be added to motor spirit to improve the octane rating, aviation turbine fuel could be reclassified as domestic kerosene if its quality deteriorates, and much of the fuel oil imported into the UK is further refined into other petroleum products. Issues can arise with product flows between different reporting companies, for example when company A delivers fuel oil to company B who report a receipt of a feedstock. Secondly, and in addition to these inter-product transfers, the data also include an allowance to cover the receipt of backflows of products from petrochemical plants that are often very closely integrated with refineries. A deduction for these backflows thus needs to be included under the "Transfers" heading so that calculated estimates reflect net output and are thus more comparable with the basis of the observed deliveries data.

3.88 However, there is scope for error in the recording of these two components. With inter-product transfers, the data are recorded within the refinery during the refining and blending processes where the usual units used to record the changes are volumes rather than masses. Different factors apply for each product when converting from a volume to mass basis, as shown by the conversion factors given in Annex A of this Digest. Thus, a balanced transfer in volume terms may not be equivalent when converted to a mass basis. This is thought to be the main source of error within the individual product balances.

3.89 With the backflows data, the scope for error results from the recording of observed deliveries data being derived from sales data on a "net" basis and will therefore exclude the element of backflows data as received at the refinery. For example, these could be seen simply as an input of fuel oils to be used as a feedstock, and thus recorded as an input without their precise nature being recorded – in effect a form of double-counting. This relationship between the petrochemical sector and refineries is thought to be one of the main sources of error in the overall oil commodity balances.

Imports and exports

3.90 The information given under the headings "imports" and "exports" in this chapter are the figures recorded by importers and exporters of oil. They can differ in some cases from the import and export figures provided by HM Revenue and Customs that are given in Annex G on the Internet. Such differences arise from timing differences between actual and declared movements but also result from the Customs figures including re-exports. These are products that may have originally entered the UK as imports from another country and been stored in the UK prior to being exported back out of the UK, as opposed to having been actually produced in the UK.

Marine bunkers

3.91 This covers deliveries to ocean going and coastal vessels under international bunker contracts. Other deliveries to fishing, coastal and inland vessels are excluded.

Crude and process oils

3.92 These are all feedstocks, other than distillation benzene, for refining at refinery plants. Gasoline feedstock is any process oil whether clean or dirty which is used as a refinery feedstock for the manufacture of gasoline or naphtha. Other refinery feedstock is any process oil used for the manufacture of any other petroleum products.

Refineries

3.93 Refineries distilling crude and process oils to obtain petroleum products. This excludes petrochemical plants, plants only engaged in re-distilling products to obtain better grades, crude oil stabilisation plants and gas separation plants.

Products used as fuel (energy use)

3.94 The following paragraphs define the product headings used in the text and tables of this chapter. The products are used for energy in some way, either directly as a fuel or as an input into electricity generation.

Refinery fuel - Petroleum products used as fuel at refineries.

Ethane – A naturally gaseous straight-chain hydrocarbon (C₂H₆) in natural gas and refinery gas streams. Primarily used, or intended to be used, as a chemical feedstock.

Propane - Hydrocarbon containing three carbon atoms(C_3H_8), gaseous at normal temperature but generally stored and transported under pressure as a liquid. Used mainly for industrial purposes, but also as transport LPG, and some domestic heating and cooking.

Butane - Hydrocarbon containing four carbon atoms(C_4H_{10}), otherwise as for propane. Additionally used as a constituent of motor spirit to increase vapour pressure and as a chemical feedstock.

Naphtha (Light distillate feedstock) - Petroleum distillate boiling predominantly below $200^\circ C$.

Aviation spirit - All light hydrocarbon oils intended for use in aviation piston-engine power units, including bench testing of aircraft engines.

Motor spirit - Blended light petroleum components used as fuel for spark-ignition internal-combustion engines other than aircraft engines:

- (i) Premium unleaded grade - all finished motor spirit, with an octane number (research method) not less than 95.
- (ii) Lead Replacement petrol / Super premium unleaded grade - finished motor spirit, with an octane number (research method) not less than 97.

Aviation turbine fuel (ATF) - All other turbine fuel intended for use in aviation gas-turbine power units and including bench testing of aircraft engines.

Burning oil (kerosene or "paraffin") - Refined petroleum fuel, intermediate in volatility between motor spirit and gas oil, used primarily for heating. White spirit and kerosene used for lubricant blends are excluded.

Gas/diesel oil - Petroleum fuel having a distillation range immediately between kerosene and light-lubricating oil:

- (i) **DERV (Diesel Engined Road Vehicle) fuel** - automotive diesel fuel for use in high speed, compression ignition engines in vehicles subject to Vehicle Excise Duty.
- (ii) **Gas oil** - used as a burner fuel in heating installations, for industrial gas turbines and as for DERV (but in vehicles not subject to Vehicle Excise Duty e.g. Agriculture vehicles, fishing vessels, construction equipment).
- (iii) **Marine diesel oil** - heavier type of gas oil suitable for heavy industrial and marine compression-ignition engines.

Fuel oil - Heavy petroleum residue blends used in atomising burners and for heavy-duty marine engines (marine bunkers, etc.) with heavier grades requiring pre-heating before combustion. Excludes fuel oil for grease making or lubricating oil and fuel oil sold as such for road making.

Products not used as fuel (non-energy use)

3.95 The following paragraphs define the product headings used in the text and tables of this chapter, which are used for non-energy purposes.

Feedstock for petroleum chemical plants - All petroleum products intended for use in the manufacture of petroleum chemicals. This includes middle distillate feedstock of which there are several grades depending on viscosity. The boiling point ranges between $200^\circ C$ and $400^\circ C$. (A deduction has been made from these figures equal to the quantity of feedstock used in making the conventional petroleum products that are produced during the processing of the feedstock. The output and deliveries of these conventional petroleum products are included elsewhere as appropriate.)

White spirit and specific boiling point (SBP) spirits – These are refined distillate intermediates with a distillation in the naphtha / kerosene range. **White spirit** has a boiling range of about $150^\circ C$ to $200^\circ C$ and is used as a paint or commercial solvent. **SBP spirit** is also known as **Industrial spirit** and has a wider boiling range that varies up to $200^\circ C$ dependent upon its eventual use. It has a

variety of uses that vary from use in seed extraction, rubber solvents and perfume.

Lubricating oils (and grease) - Refined heavy distillates obtained from the vacuum distillation of petroleum residues. Includes liquid and solid hydrocarbons sold by the lubricating oil trade, either alone or blended with fixed oils, metallic soaps and other organic and/or inorganic bodies. A certain percentage of inland deliveries are re-used as a fuel (see paragraphs 3.56 to 3.63).

Bitumen - The residue left after the production of lubricating oil distillates and vacuum gas oil for upgrading plant feedstock. Used mainly for road making and building construction purposes. Includes other petroleum products such as creosote and tar mixed with bitumen for these purposes and fuel oil sold specifically for road making.

Petroleum wax - Includes paraffin wax, which is a white crystalline hydrocarbon material of low oil content normally obtained during the refining of lubricating oil distillate, paraffin scale, slack wax, microcrystalline wax and wax emulsions. Used for candle manufacture, polishes, food containers, wrappings etc.

Petroleum cokes - Carbonaceous material derived from hydrocarbon oils, uses for which include metallurgical electrode manufacture. Quantities of imports of this product are used as a fuel (see paragraphs 3.60 to 3.63).

Miscellaneous products - Includes aromatic extracts, defoamant solvents and other minor miscellaneous products.

Main classes of consumer

3.96 The following are definitions of the main groupings of users of petroleum products used in the text and tables of this chapter.

Electricity generators - Petroleum products delivered for use by major power producers and other companies for electricity generation including those deliveries to the other industries listed below which are used for autogeneration of electricity (Tables 3.2 to 3.4). This includes petroleum products used to generate electricity at oil refineries and is recorded in the Transformation sector, as opposed to other uses of refinery fuels that are recorded in the Energy Industry Use sector. These numbers may not necessarily be the same as those reported in the **Electricity** chapter (Chapter 5), which gives **consumption** of petroleum products by electricity generators. Differences occur because delivered fuel may be put to stock and not used immediately.

Agriculture - Deliveries of fuel oil and gas oil/diesel for use in agricultural power units, dryers and heaters. Burning oil for farm use.

Iron and steel - Deliveries of petroleum products to steel works and iron foundries. This is now based on information from the Iron and Steel Statistics Bureau.

Other industries - The industries covered correspond to the industrial groups shown in Table 1E excluding Iron and Steel of Chapter 1.

National navigation - Fuel oil and gas/diesel oil delivered, other than under international bunker contracts, for fishing vessels, UK oil and gas exploration and production, coastal and inland shipping and for use in ports and harbours.

Railways - Deliveries of fuel oil, gas/diesel oil and burning oil to railways now based on estimates produced by AEA Energy and Environment as part of their work to compile the UK Greenhouse Gas Inventory.

Air transport - Total inland deliveries of aviation turbine fuel and aviation spirit. The figures cover deliveries of aviation fuels in the United Kingdom to international and other airlines, British and foreign Governments (including armed services) and for private flying. In order to compile the UK Greenhouse Gas Inventory, AEA Energy and Environment need to estimate how aviation fuel usage splits between domestic and international consumption. Information from AEA Energy and Environment suggests that virtually all aviation spirit is used domestically while just 6 per cent (729 thousand tonnes) of civilian aviation turbine fuel use is for domestic consumption.

Road transport - Deliveries of motor spirit and DERV fuel for use in road vehicles of all kinds.

As part of the 2003 Energy White Paper remit to provide more regional data, DECC commissioned AEA Energy and Environment to provide estimates for regional and local use of road transport fuels. This work was first published in the June 2005 edition of Energy Trends with figures for 2002 and 2003 and has been updated in the June 2007 edition of Energy Trends to include figures for 2005:

www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx

Domestic - Fuel oil and gas oil delivered for central heating of private houses and other dwellings and deliveries of kerosene (burning oil) and liquefied petroleum gases for domestic purposes (see Tables 3.2 to 3.4).

Public services - Deliveries to national and local Government premises (including educational, medical and welfare establishments and British and foreign armed forces) of fuel oil and gas oil for central heating and of kerosene (burning oil).

Miscellaneous - Deliveries of fuel oil and gas oil for central heating in premises other than those classified as domestic or public.

Monthly and quarterly data

3.97 Monthly or quarterly aggregate data for certain series presented in this chapter are available. This information can be obtained free of charge by following the links given in the Energy Statistics section of the DECC web site, at: www.decc.gov.uk/en/content/cms/statistics/statistics.aspx.

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3.1 Commodity balances 2006 - 2008⁽¹⁾

Primary oil

	Thousand tonnes							
	Crude oil	Ethane	Propane	Butane	Condensate	Total NGL	Feedstock	Total primary oil
2006								
Supply								
Production	69,665	1,281	1,947	1,542	2,143	6,913	-	76,578
Imports	51,446	-	-	-	-	-	7,997	59,443
Exports	-44,923	-17	-891	-488	-1,232	-2,628	-2,643	-50,195
Stock change (2)	-354	..	..	..	..	-79	+78	-355
Transfers	-	-1,264	-848	-484	-427	-3,024	+683	-2,341
Total supply	75,834	..	..	..	..	1,182	6,115	83,130
Statistical difference (3)(4)	-10	..	..	..	..	+12	-85	-83
Total demand (4)	75,844	..	..	..	..	1,169	6,200	83,213
Transformation (Petroleum refineries) (4)	75,844	..	..	..	..	1,169	6,200	83,213
Energy industry use	-	-	-	-	-	-	-	-
2007								
Supply								
Production	70,357	1,153r	1,796r	1,412r	1,858r	6,218r	-	76,575r
Imports	49,893	62r	84r	50r	61r	257r	7,206	57,357r
Exports	-45,129	-13	-836	-548	-1,186	-2,584	-3,287	-50,999
Stock change (2)	+650	..	..	..	..	+9	+125	+784
Transfers	-	-1,203	-861	-558	-603	-3,225	+547	-2,678
Total supply	75,772	..	..	..	..	675	4,591	81,038
Statistical difference (3)(4)	+66	..	..	..	..	-6	-139	-79
Total demand (4)	75,707	..	..	..	..	681	4,730	81,117
Transformation (Petroleum refineries) (4)	75,707	..	..	..	..	681	4,730	81,117
Energy industry use	-	-	-	-	-	-	-	-
2008								
Supply								
Production	65,497	1,202	1,953	1,439	1,574	6,168	-	71,665
Imports	51,466	180	223	124	122	649	7,959	60,074
Exports	-41,504	-12	-1,369	-683	-975	-3,039	-3,867	-48,410
Stock change (2)	+260	..	..	..	..	+59	-88	+232
Transfers	-	-1,328	-828	-547	-432	-3,135	+208	-2,928
Total supply	75,719	..	..	..	..	702	4,212	80,633
Statistical difference (3)(4)	-125	..	..	..	..	+60	-26	-91
Total demand (4)	75,844	..	..	..	..	642	4,238	80,725
Transformation (Petroleum refineries) (4)	75,844	..	..	..	..	642	4,238	80,725
Energy industry use	-	-	-	-	-	-	-	-

(1) As there is no use made of primary oils and feedstocks by industries other than the oil and gas extraction and petroleum refining industries, other industry headings have not been included in this table. As such, this table is a summary of the activity of what is known as the Upstream oil industry.

(2) Stock fall (+), stock rise (-).

(3) Total supply minus total demand.

(4) Figures for total demand for the individual NGLs (and thus for the statistical differences as well) are not available.

Note:

Differences between the upstream and downstream balance are currently being investigated.

3.2 Commodity balances 2008

Petroleum products

	Thousand tonnes								
	Ethane	Propane	Butane	Other gases	Naphtha	Aviation spirit	Motor spirit	White Spirit & SBP	Aviation turbine fuel
Supply									
Production	-	1,612	636	2,780	1,863	0	20,319	55	6,549
Other sources	1,328	828	547	-	432	-	-	-	-
Imports	12	257	548	-	634	22	3,302	89	7,961
Exports	-	-565	-495	-	-2,055	-2	-7,017	-4	-1,908
Marine bunkers	-	-	-	-	-	-	-	-	-
Stock change (2)	-	0	30	0	-6	1	27	5	-154
Transfers	-	-	-54	0	-4	1	17	-0	-300
Total supply	1,340	2,133	1,212	2,780	863	22	16,648	144	12,148
Statistical difference (3)	12	54	-3	-4	14	-8	-30	-0	6
Total demand	1,328	2,079	1,215	2,785	848	30	16,678	145	12,142
Transformation	-	-	-	343	-	-	-	-	-
Electricity generation	-	-	-	343	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	343	-	-	-	-	-
Heat generation	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Energy industry use	-	-	-	2,312	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-	-
Oil & gas extraction	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	2,312	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-	-
Final consumption	1,328	2,079	1,215	130	848	30	16,678	145	12,142
Industry	-	361	312	-	0	-	-	-	-
Unclassified	-	361	312	-	0	-	-	-	-
Iron & steel	-	-	-	-	-	-	-	-	-
Non-ferrous metals	-	-	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-	-	-	-
Paper, printing etc	-	-	-	-	-	-	-	-	-
Other industries	-	-	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-	-	-
Transport	-	125	-	-	-	30	16,678	-	12,142
Air	-	-	-	-	-	30	-	-	12,142
Rail	-	-	-	-	-	-	-	-	-
Road	-	125	-	-	-	-	16,678	-	-
National navigation	-	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-	-
Other	-	401	33	-	-	-	-	-	-
Domestic	-	297	33	-	-	-	-	-	-
Public administration	-	-	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-	-	-
Agriculture	-	104	0	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-	-
Non energy use (4)	1,328	1,192	870	130	848	-	-	145	-

(1) Includes marine diesel oil.

(2) Stock fall (+), stock rise (-).

(3) Total supply minus total demand.

(4) For further details on non-energy usage see paragraphs 3.57 to 3.64.

3.2 Commodity balances 2008 (continued)

Petroleum products

									Thousand tonnes
Burning oil	Gas/Diesel Oil ⁽¹⁾	Fuel oils	Lubri-cants	Bitu-men	Petroleum wax	Petroleum coke	Misc. products	Total Products	
									Supply
3,092	26,971	11,349	514	1,485	8	2,029	1,174	80,435	Production
-	-	-	-	-	-	-	-	3,135	Other sources
528	7,468	1,198	448	422	38	883	107	23,916	Imports
-213	-7,277	-7,304	-399	-195	-13	-608	-756	-28,811	Exports
-	-680	-1,915	-	-	-	-	-	-2,594	Marine bunkers
5	-5	150	-40	-7	-1	-7	15	14	Stock change (2)
288	11	-186	-12	5	12	-	13	-208	Transfers
3,699	26,489	3,292	512	1,710	44	2,296	552	75,887	Total supply
6	-91	1	2	-31	-2	1	8	-64	Statistical difference (3)
3,694	26,580	3,291	510	1,741	46	2,295	544	75,951	Total demand
									Transformation
-	22	805	-	-	-	-	-	1,170	Electricity generation
-	16	545	-	-	-	-	-	905	Major power producers
-	6	364	-	-	-	-	-	371	Autogenerators
-	10	180	-	-	-	-	-	534	Heat generation
-	5	52	-	-	-	-	-	57	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	208	-	-	-	-	-	208	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Other
0	-	853	-	0	-	1,367	-	4,531	Energy industry use
-	-	-	-	-	-	-	-	-	Electricity generation
-	-	-	-	-	-	-	-	-	Oil & gas extraction
0	-	853	-	0	-	1,367	-	4,531	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	-	-	-	Other
-	-	-	-	-	-	-	-	-	Losses
3,693	26,559	1,633	510	1,741	46	928	544	70,249	Final Consumption
									Industry
1,445	2,883	806	-	-	-	-	-	5,807	Unclassified
1,445	-	-0	-	-	-	-	-	2,118	Iron & steel
-	-	12	-	-	-	-	-	12	Non-ferrous metals
-	19	25	-	-	-	-	-	44	Mineral products
-	160r	1	-	-	-	-	-	161r	Chemicals
-	97r	68	-	-	-	-	-	165	Mechanical engineering etc
-	73r	19	-	-	-	-	-	92r	Electrical engineering etc
-	36r	8	-	-	-	-	-	44r	Vehicles
-	87r	22	-	-	-	-	-	109r	Food, beverages etc
-	221r	43	-	-	-	-	-	264r	Textiles, leather, etc
-	87r	10	-	-	-	-	-	97r	Paper, printing etc
-	30	31	-	-	-	-	-	61	Other industries
-	1943r	548	-	-	-	-	-	2,491r	Construction
-	130r	19	-	-	-	-	-	149r	Transport
4	22,301	644	-	-	-	-	-	51,924	Air
-	-	-	-	-	-	-	-	12,172	Rail
4	682	-	-	-	-	-	-	686	Road
-	20,613	-	-	-	-	-	-	37,416	National navigation
-	1,005	644	-	-	-	-	-	1,649	Pipelines
-	-	-	-	-	-	-	-	-	Other
2,244	1,173	183	-	-	-	-	-	4,035	Domestic
2,236	164	-	-	-	-	-	-	2,730	Public administration
4	362	71	-	-	-	-	-	437	Commercial
-	295	77	-	-	-	-	-	372	Agriculture
4	140	24	-	-	-	-	-	272	Miscellaneous
-	212	11	-	-	-	-	-	223	
-	201	-	510	1,741	46	928	544	8,483	Non energy use (4)

3.3 Commodity balances 2007

Petroleum products

Thousand tonnes

	Ethane	Propane	Butane	Other gases	Naphtha	Aviation spirit	Motor spirit	White Spirit & SBP	Aviation turbine fuel
Supply									
Production	-	1,697	601	2,633r	2,561	0	21,313	70	6,176
Other sources	1,203	861	558	-	603	-	-	-	-
Imports	-	386r	473	8	1,713r	21	3,265	107	7,708r
Exports	-0	-979r	-578	-	-3,014r	-4	-7,331r	-7	-1,221r
Marine bunkers	-	-	-	-	-	-	-	-	-
Stock change (2)	2	11	33	0	69	5	106	2	182
Transfers	-	-0	-40	8	14	8	59	-1	-338
Total supply	1,204	1,976r	1,046	2,648r	1,946r	30	17,413r	171	12,507r
Statistical difference (3)	8	22r	110	-86	-1	-3	-181	4	-67r
Total demand	1,197	1,955r	937	2,734r	1,947r	33	17,594r	167	12,574r
Transformation	-	-	-	251	-	-	-	-	-
Electricity generation	-	-	-	251	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	251	-	-	-	-	-
Heat generation	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Energy industry use	-	39	-	2,116r	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-	-
Oil & gas extraction	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	39	-	2,116r	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-	-
Final consumption	1,197	1,916r	937	367	1,947r	33	17,594r	167	12,574r
Industry	49	664	194	-	-	-	-	-	-
Unclassified	49	664	194	-	-	-	-	-	-
Iron & steel	-	-	-	-	-	-	-	-	-
Non-ferrous metals	-	-	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-	-	-	-
Paper, printing etc	-	-	-	-	-	-	-	-	-
Other industries	-	-	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-	-	-
Transport	-	119	-	-	-	33	17,594r	-	12,574r
Air	-	-	-	-	-	33	-	-	12,574r
Rail	-	-	-	-	-	-	-	-	-
Road	-	119	-	-	-	-	17,594r	-	-
National navigation	-	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-	-
Other	-	323	26	-	-	-	-	-	-
Domestic	-	225	26	-	-	-	-	-	-
Public administration	-	-	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-	-	-
Agriculture	-	98	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-	-
Non energy use (4)	1,148	811r	717	367	1,947r	-	-	167	-

(1) Includes marine diesel oil.

(2) Stock fall (+), stock rise (-).

(3) Total supply minus total demand.

(4) For further details on non-energy usage see paragraphs 3.57 to 3.64.

3.3 Commodity balances 2007 (continued)

Petroleum products

Thousand tonnes

Burning oil	Gas/Diesel Oil ⁽¹⁾	Fuel oils	Lubri-cants	Bitu-men	Petroleum wax	Petroleum coke	Misc. products	Total Products	
Supply									
2,968	26,458r	11,452r	547	1,628	12	1,979r	1,175r	81,270r	Production
-	-	-	-	-	-	-	-	3,225	Other sources
551	8,172r	1,141r	375r	477r	37	485	173r	25,093r	Imports
-356r	-6,551r	-7,739	-194	-532r	-21	-613	-877r	-30,017r	Exports
-	-901	-1,471	-	-	-	-	-	-2,371	Marine bunkers
33	462r	137	-47	26	19	-4	-42	995r	Stock change ⁽²⁾
363	-240	-419	33	9	16	-0	-19	-547	Transfers
3,560r	27,399r	3,102r	715r	1,607r	62	1,847r	412r	77,647r	Total supply
-70r	220r	-126r	43r	44r	23	0	-7r	-70r	Statistical difference ⁽³⁾
3,631	27,180r	3,228r	672	1,563r	39	1,847r	419r	77,716r	Total demand
Transformation									
-	30	593	-	-	-	-	-	874	Electricity generation
-	25	340	-	-	-	-	-	616	Major power producers
-	10	192	-	-	-	-	-	202	Autogenerators
-	15	148	-	-	-	-	-	414	Heat generation
-	5	52	-	-	-	-	-	57	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	201	-	-	-	-	-	201	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Other
1	5	1,019r	-	-	-	1,303r	-	4,482r	Energy industry use
-	-	-	-	-	-	-	-	-	Electricity generation
-	-	-	-	-	-	-	-	-	Oil & gas extraction
1	5	1,019r	-	-	-	1,303r	-	4,482r	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	-	-	-	Other
-	-	-	-	-	-	-	-	-	Losses
3,630	27,144r	1,616	672	1,563r	39	544	419r	72,359r	Final Consumption
Industry									
1,424	2,957	931	-	-	-	-	-	6,218	Unclassified
1,424	-	-	-	-	-	-	-	2,330	Iron & steel
-	-	19	-	-	-	-	-	19	Non-ferrous metals
-	20	25	-	-	-	-	-	46	Mineral products
-	180	1	-	-	-	-	-	181	Chemicals
-	104	76	-	-	-	-	-	180	Mechanical engineering etc
-	81	18	-	-	-	-	-	99	Electrical engineering etc
-	25	8	-	-	-	-	-	33	Vehicles
-	91	23	-	-	-	-	-	114	Food, beverages etc
-	208	40	-	-	-	-	-	248	Textiles, leather, etc
-	100	10	-	-	-	-	-	110	Paper, printing etc
-	29	32	-	-	-	-	-	61	Other industries
-	1,984	657	-	-	-	-	-	2,641	Construction
-	135	21	-	-	-	-	-	156	Transport
12	22,639r	569	-	-	-	-	-	53,541r	Air
-	-	-	-	-	-	-	-	12,607r	Rail
12	632	-	-	-	-	-	-	644	Road
-	21,065r	-	-	-	-	-	-	38,779r	National navigation
-	942	569	-	-	-	-	-	1,511	Pipelines
-	-	-	-	-	-	-	-	-	Other
2,194	1,310	116	-	-	-	-	-	3,969	Domestic
2,170	173	-	-	-	-	-	-	2,594	Public administration
12	393	45	-	-	-	-	-	450	Commercial
-	323	55	-	-	-	-	-	378	Agriculture
12	143	10	-	-	-	-	-	262	Miscellaneous
-	278	7	-	-	-	-	-	286	
-	238r	-	672	1,563r	39	544	419r	8,631r	Non energy use ⁽⁴⁾

3.4 Commodity balances 2006

Petroleum products

Thousand tonnes

	Ethane	Propane	Butane	Other gases	Naphtha	Aviation spirit	Motor spirit	White Spirit & SBP	Aviation turbine fuel
Supply									
Production	0	1,737	406	2,862	2,734	26	21,443	107	6,261
Other sources	1,264	848	484	-	427	-	-	-	-
Imports	12	275	545	0	2,003	16	3,790	82	7,983
Exports	-13	-683	-463	-	-2,925	-3	-6,997	-2	-995
Marine bunkers	-	-	-	-	-	-	-	-	-
Stock change (2)	-2	-1	-39	0	-43	-6	-29	-27	-256
Transfers	-	-	-26	-	67	15	15	-	-404
Total supply	1,262	2,176	906	2,863	2,264	47	18,223	159	12,589
Statistical difference (3)	+5	-39	-44	-2	-14	+2	+79	+3	-52
Total demand	1,257	2,215	950	2,865	2,278	46	18,144	156	12,641
Transformation	-	-	-	206	-	-	-	-	-
Electricity generation	-	-	-	206	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	206	-	-	-	-	-
Heat generation	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Energy industry use	-	38	-	2,201	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-	-
Oil & gas extraction	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	38	-	2,201	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-	-
Final consumption	1,257	2,177	950	457	2,278	46	18,144	156	12,641
Industry	66	671	179	-	-	-	-	-	-
Unclassified	66	671	179	-	-	-	-	-	-
Iron & steel	-	-	-	-	-	-	-	-	-
Non-ferrous metals	-	-	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-	-	-	-
Paper, printing etc	-	-	-	-	-	-	-	-	-
Other industries	-	-	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-	-	-
Transport	-	126	-	-	-	46	18,144	-	12,641
Air	-	-	-	-	-	46	-	-	12,641
Rail	-	-	-	-	-	-	-	-	-
Road	-	126	-	-	-	-	18,144	-	-
National navigation	-	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-	-
Other	-	386	34	-	-	-	-	-	-
Domestic	-	281	34	-	-	-	-	-	-
Public administration	-	-	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-	-	-
Agriculture	-	105	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-	-
Non energy use (4)	1,191	994	737	457	2,278	-	-	156	-

(1) Includes marine diesel oil.

(2) Stock fall (+), stock rise (-).

(3) Total supply minus total demand.

(4) For further details on non-energy usage see paragraphs 3.57 to 3.64.

3.4 Commodity balances 2006 (continued)

Petroleum products

Thousand tonnes

Burning oil	Gas/Diesel Oil ⁽¹⁾	Fuel oils	Lubri-cants	Bitu-men	Petroleum wax	Petroleum coke	Misc. products	Total Products	
Supply									
3,374	26,080	12,277	617	1,749	16	1,964	1,189	82,839	Production
-	-	-	-	-	-	-	-	3,024	Other sources
670	8,063	1,332	505	404	77	869	200	26,828	Imports
-314	-5,819	-8,368	-401	-628	-39	-559	-801	-29,009	Exports
-	-1,035	-1,313	-	-	-	-	-	-2,348	Marine bunkers
-107	-283	-140	+18	+11	+4	-15	+73	-840	Stock change ⁽²⁾
403	-205	-573	+1	+22	+0	+0	+3	-682	Transfers
4,027	26,800	3,216	740	1,558	57	2,260	664	79,812	Total supply
+10	+49	+68	+27	-52	+9	-23	+36	63	Statistical difference ⁽³⁾
4,017	26,751	3,148	713	1,610	48	2,283	628	79,749	Total demand
Transformation									
-	89	688	-	-	-	-	-	984	Electricity generation
-	83	405	-	-	-	-	-	695	Major power producers
-	61	202	-	-	-	-	-	263	Autogenerators
-	22	204	-	-	-	-	-	432	Heat generation
-	6	53	-	-	-	-	-	59	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	230	-	-	-	-	-	230	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Other
1	44	997	-	1	-	1,358	-	4,639	Energy industry use
-	-	-	-	-	-	-	-	-	Electricity generation
-	-	-	-	-	-	-	-	-	Oil & gas extraction
1	44	997	-	1	-	1,358	-	4,639	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	-	-	-	Other
-	-	-	-	-	-	-	-	-	Losses
4,016	26,618	1,463	713	1,610	48	925	628	74,126	Final Consumption
Industry									
1,540	3,047	844	-	-	-	-	-	6,348	Unclassified
1,540	-	-	-	-	-	-	-	2,456	Iron & steel
-	-	19	-	-	-	-	-	19	Non-ferrous metals
-	22	28	-	-	-	-	-	50	Mineral products
-	183	1	-	-	-	-	-	184	Chemicals
-	105	72	-	-	-	-	-	176	Mechanical engineering etc
-	81	18	-	-	-	-	-	98	Electrical engineering etc
-	70	9	-	-	-	-	-	78	Vehicles
-	92	22	-	-	-	-	-	115	Food, beverages etc
-	219	42	-	-	-	-	-	261	Textiles, leather, etc
-	110	11	-	-	-	-	-	121	Paper, printing etc
-	23	33	-	-	-	-	-	56	Other industries
-	2,002	571	-	-	-	-	-	2,573	Construction
-	141	19	-	-	-	-	-	161	Transport
12	21,985	504	-	-	-	-	-	53,457	Air
-	-	-	-	-	-	-	-	12,686	Rail
12	654	-	-	-	-	-	-	666	Road
-	20,146	-	-	-	-	-	-	38,416	National navigation
-	1,185	504	-	-	-	-	-	1,689	Pipelines
-	-	-	-	-	-	-	-	-	Other
2,464	1,327	114	-	-	-	-	-	4,326	Domestic
2,440	171	-	-	-	-	-	-	2,927	Public administration
12	393	46	-	-	-	-	-	451	Commercial
-	314	50	-	-	-	-	-	364	Agriculture
12	145	10	-	-	-	-	-	272	Miscellaneous
-	304	9	-	-	-	-	-	312	Non energy use ⁽⁴⁾
-	258	-	713	1,610	48	925	628	9,995	

3.5 Supply and disposal of petroleum⁽¹⁾

	Thousand tonnes				
	2004	2005	2006	2007	2008
Primary oils (Crude oil, NGLs and feedstocks)					
Indigenous production (2)	95,374	84,721	76,578	76,575r	71,665
Imports	62,517	58,885	59,443	57,357r	60,074
Exports (3)	-64,504	-54,099	-50,195	-50,999	-48,410
Transfers - Transfers to products (4)	-3,724	-3,387	-3,024	-3,225	-3,135
Product rebrands (5)	+181	+332	+683	+547	+208
Stock change (6)	-133	-385	-355	+784	+232
Use during production (7)	-2	-1	-	-	-
Calculated refinery throughput (8)	89,710	86,069	83,130	81,038	80,633
Overall statistical difference (9)	-110	-65	-83	-79	-91
Actual refinery throughput	89,821	86,134	83,213	81,117	80,725
Petroleum products					
Losses in refining process (10)	-7	371	374	-153	290
Refinery gross production (11)	89,828	85,763	82,839	81,270r	80,435
Transfers - Transfers to products (4)	+3,724	+3,386	+3,024	3,225	3,135
Product rebrands (5)	-203	-333	-682	-547	-208
Imports	18,545	22,512	26,828	25,093r	23,916
Exports (12)	-30,495	-29,722	-29,009	-30,017r	-28,811
Marine bunkers	-2,085	-2,055	-2,348	-2,371	-2,594
Stock changes (6) - Refineries	-232	+1,043	-890	989r	-113
Power generators	-57	+3	+51	+5	+127
Calculated total supply	79,025	80,598	79,812	77,647r	75,887
Statistical difference (9)	-41	-137	+63	-70r	-64
Total demand (4)	79,066	80,735	79,749	77,716r	75,951
Of which:					
Energy use	68,482	70,296	69,753	69,085r	67,468
Of which, for electricity generation (13)	593	650	695	616	905
total refinery fuels (13)	5,417	5,601	4,639	4,482r	4,531
Non-energy use	10,584	10,439	9,995	8,631r	8,483

(1) Aggregate monthly data on oil production, trade, refinery throughput and inland deliveries are available - see paragraph 3.94 and Annex C.

(2) Crude oil plus condensates and petroleum gases derived at onshore treatment plants.

(3) Includes NGLs, process oils and re-exports.

(4) Disposals of NGLs by direct sale (excluding exports) or for blending.

(5) Product rebrands (inter-product blends or transfers) represent petroleum products received at refineries/ plants as process for refinery or cracking unit operations.

(6) Impact of stock changes on supplies. A stock fall is shown as (+) as it increases supplies, and vice-versa for a stock rise (-).

(7) Own use in onshore terminals and gas separation plants. These figures ceased to be available from January 2001 with the advent of the new PPRS system.

(8) Equivalent to the total supplies reported against the upstream transformation sector in Table 3.1.

(9) Supply greater than (+) or less than (-) recorded throughput or disposals.

(10) Calculated as the difference between actual refinery throughput and gross refinery production.

(11) Includes refinery fuels.

(12) Excludes NGLs.

(13) Figures cover petroleum used to generate electricity by all major power producers and by all other generators, including petroleum used to generate electricity at refineries. These quantities are also included in the totals reported as used as refinery fuel, so there is thus some overlap in these figures.

Note:

Differences between the upstream and downstream balance are currently being investigated.

3.6 Additional information on inland deliveries of selected products⁽¹⁾⁽²⁾⁽³⁾

	Thousand tonnes				
	2004	2005	2006	2007	2008
Motor spirit					
Retail deliveries (4)					
Hypermarkets (5)					
Lead Replacement Petrol/Super premium unleaded (6)	119	130	229	263r	195
Premium unleaded	6,019	6,580	6,838	6,616r	6,722
Total hypermarkets	6,138	6,710	7,067	6,879	6,917
Refiners/other traders					
Lead Replacement Petrol/Super premium unleaded (6)	765	818	509	551r	836
Premium unleaded	11,776	10,374	9,866	9,376r	8,314
Total Refiners/other traders	12,541	11,193	10,375	9,927r	9,150
Total retail deliveries					
Lead Replacement Petrol/Super premium unleaded (6)	884	949	738	814	1,032
Premium unleaded	17,795	16,954	16,704	15,991r	15,036
Total retail deliveries	18,679	17,903	17,442	16,806r	16,068
Commercial consumers (7)					
Lead Replacement Petrol/Super premium unleaded (6)	40	16	65	25r	41
Premium unleaded	765	812	637	764r	570
Total commercial consumers	805	828	702	789r	611
Total motor spirit	19,484	18,731	18,144	17,594r	16,678
Unleaded as % of Total motor spirit	99.5	99.9	99.9	100	100
Gas oil/diesel oil					
DERV fuel:					
Retail deliveries (4):					
Hypermarkets (5)	2,474	3,091	3,917	4,161r	4,352
Refiners/other traders	7,043	7,587	7,536	8,182r	8,518
Total retail deliveries	9,517	10,678	11,453	12,344r	12,870
Commercial consumers (7)	8,997	8,757	8,693	8,721r	7,743
Total DERV fuel	18,514	19,435	20,146	21,065r	20,614
Other gas oil (8)	6,030	6,794	6,567	6,109r	5,967
Total gas oil/diesel oil	24,544	26,229	26,713	27,174r	26,580
Fuel oils (9)					
Light	214	209	287	626r	614
Medium	961	918	875	203r	295
Heavy	888	837	989	1,380r	1,530
Total fuel oils	2,062	1,965	2,151	2,209	2,439

(1) Aggregate monthly data for inland deliveries of oil products are available - see paragraph 3.94 and Annex C.

(2) The end use section analyses are based partly on recorded figures and on estimates. They are intended for general guidance only. See also the notes in the main text of this chapter.

(3) For a full breakdown of the end-uses of all oil products, see Commodity Balances in Tables 3.2 to 3.4.

(4) Retail deliveries - deliveries to garages, etc. mainly for resale to final consumers.

(5) Data for sales by super and hypermarket companies are collected via a separate reporting system, but are consistent with the main data collected from UKPIA member companies - see paragraph 3.76.

(6) Sales of Leaded Petrol ceased on 31 December 1999. Separate breakdowns for lead replacement and super premium unleaded petrol are no longer provided, see Digest of UK Energy Statistics 2007 chapter 3 paragraph 3.49 for details.

(7) Commercial consumers - direct deliveries for use in consumer's business.

(8) Includes marine diesel oil.

(9) Inland deliveries excluding that used as a fuel in refineries, but including that used for electricity generation by major electricity producers and other industries.

3.7 Stocks of crude oil and petroleum products at end of year⁽¹⁾

	Thousand tonnes				
	2004	2005	2006	2007	2008
Crude and process oils					
Refineries (2)	4,440	4,875	4,720	4,704	4,616
Terminals (3)	1,261	1,129	1,635	1,131	1,092
Offshore (4)	736	798	766	638	664
Total crude and process oils (5)	6,648	7,067	7,415	6,874	6,787
Petroleum products					
Ethane	6	6	8	6	6
Propane	119	111	111	83	83
Butane	113	100	140	103	74
Other petroleum gases	1	-	-	0	0
Naphtha	575	500	543	463	469
Aviation spirit	2	4	10	5	4
Motor spirit	1,503	1,047	1,081	865r	1,063
White spirit & SBP	29	24	51	22	18
Aviation turbine fuel	759	663	919	833	1,116
Burning oil	310	290	397	233	228
Gas/Diesel oil (6)	2,721	2,956	3,083	3,357r	4,339
Fuel oils	987	1,063	1,264	959	839
Lubricating oils	182	103	84	131	171
Bitumen	205	204	193	166	173
Petroleum wax	12	33	29	10	11
Petroleum coke	254	280	295	420	427
Miscellaneous products	197	179	106	147	132
Total all products	7,975	7,562	8,312	7,805r	9,153
Of which : net bilateral stocks (7)	1,315	1,322	1,231	886r	2,104

(1) Aggregate monthly data on the level of stocks of crude oil and oil products are available - see paragraph 3.98 and Annex C.

(2) Stocks of crude oil, NGLs and process oils at UK refineries.

(3) Stocks of crude oil and NGLs at UKCS pipeline terminals.

(4) Stocks of crude oil in tanks and partially loaded tankers at offshore fields.

(5) Includes process oils held abroad for UK use approved by bilateral agreements.

(6) Includes middle distillate feedstock and marine diesel oil.

(7) The difference between stocks held abroad for UK use under approved bilateral agreements and the equivalent stocks held in the UK for foreign use.

Chapter 4

Natural gas

Introduction

4.1 This chapter presents five data tables on the production, transmission and consumption of natural gas and colliery methane, and a map showing the gas transmission system in the UK (page 108). An energy flow chart for 2008, showing the flows of natural gas from production and imports through to consumption, is included overleaf, as a way of simplifying the figures that can be found in the commodity balance for gas in Table 4.1. It illustrates the flow of gas from the point at which it becomes available from home production or imports (on the left) to the eventual final use of gas (on the right) as well as the gas transformed into other forms of energy or exported. The commodity balances for natural gas and colliery methane form the first table (Table 4.1). This is followed by a five year table showing the supply, transmission and consumption of these gases as a time series (Table 4.2). A more detailed examination of the various stages of natural gas from gross production through to consumption is given in Table 4.3. Table 4.4 details the UK's gas storage sites and interconnector pipelines, while Table 4.5 shows the UK's imports and exports of gas. Long term trends commentary and a table on production and consumption of gas back to 1970 are to be found on DECC's Energy Statistics web site at:

www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

4.2 Petroleum gases are covered in Chapter 3. Gases manufactured in the coke making and iron and steel making processes (coke oven gas and blast furnace gas) appear in Chapter 2. Biogases (landfill gas and sewage gas) are part of Chapter 7. Details of net selling values of gas for the domestic, industrial and other sectors are to be found in Chapter 1.

Commodity balances for gas (Table 4.1)

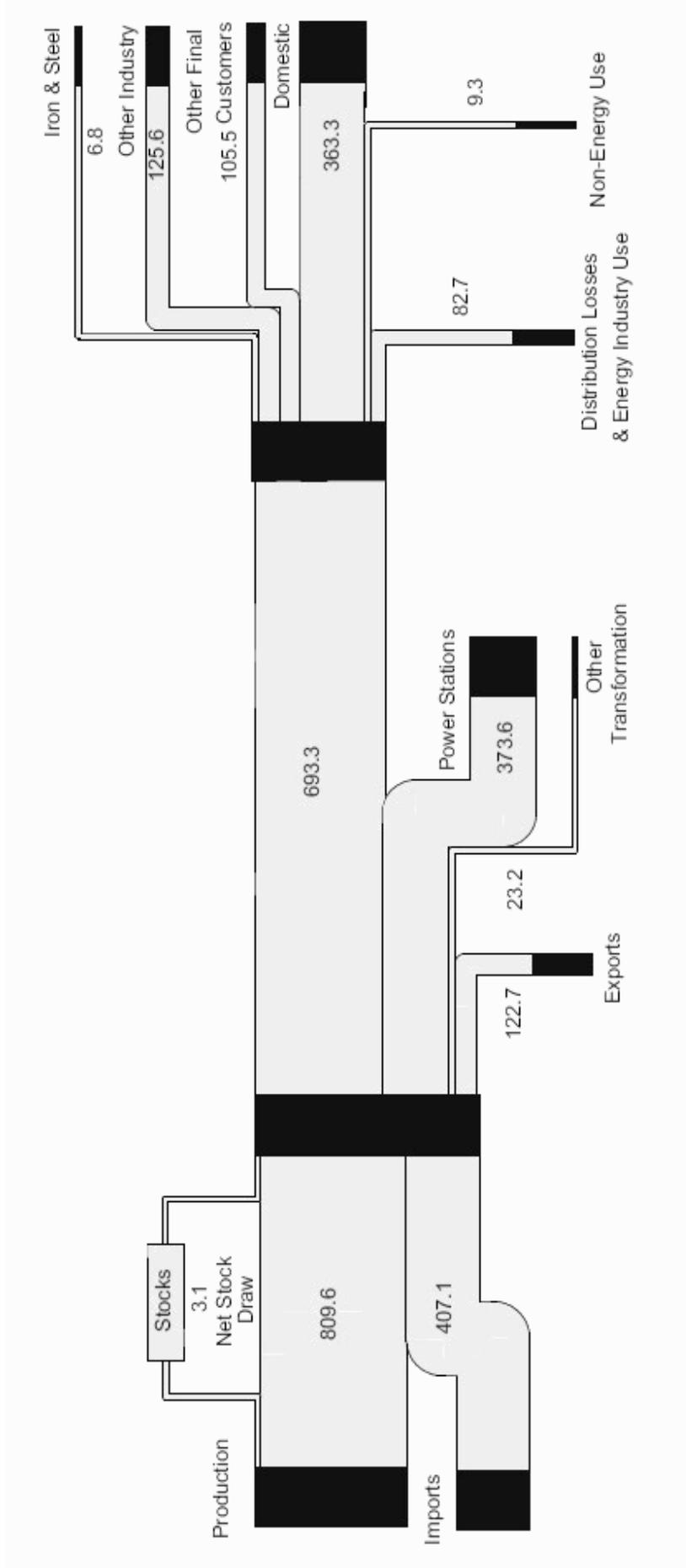
4.3 Total supply of gas is made up of production (see paragraph 4.23), net trade and stock change. In 2006, the UK was a net importer of gas (as it has been since 2004), with imports of natural gas 123 TWh higher than exports. In 2007, these net imports increased to 215 TWh and accounted for 20 per cent of total natural gas supply, increasing further in 2008 to 284 TWh (26 per cent of total gas supply).

4.4 Imports of natural gas from the Norwegian sector of the North Sea began to decline in the late 1980s as output from the Frigg field tailed off. Frigg finally ceased production in October 2004. The southern part of the Langeled pipeline from Sleipner to the UK became operational in October 2006 and has a potential capacity of 27 billion cubic metres per year (bcm/y). The interconnector linking the UK's transmission network with Belgium via a Bacton to Zeebrugge pipeline began to operate in October 1998, allowing both imports from and exports to mainland Europe. Whilst the flow has mainly been to the continent, since 1998 there has been an increase in imports. In November 2005, the interconnectors import capacity was almost doubled from 8.5 bcm/y to 16.5 bcm/y. In July 2005 imports of liquefied natural gas (LNG) commenced at the Isle of Grain LNG import facility, the first time LNG had been imported to the UK since the early 1980s.

4.5 A second interconnector linking the Netherlands to the UK began transporting gas to the UK in December 2006 - the Balgzand-Bacton (BBL) pipeline comes ashore at Bacton in Norfolk and has a potential capacity of 16 bcm/y. Exports to mainland Europe from the UK's share of the Markham field began in 1992 with Windermere's output being added in 1997, Minke and Grove in 2007, and Chiswick in 2008. Exports to the Republic of Ireland started in 1995. (See Map 4.2).

4.6 Demand for natural gas is the sum of use for transformation, energy industry's own use, and of final consumption. It is traditionally slightly less than supply because of the various measurement differences described in paragraphs 4.47 to 4.50. In 2008, demand was 0.9 TWh (just under 0.1 per cent) less than supply.

Natural gas flow chart 2008 (TWh)



Notes:
This flow chart is based on the data that appear in Table 4.1, excluding colliery methane.

4.7 In 2008, 34 per cent of natural gas demand (374 TWh) was for electricity generation (transformation sector), 1 percentage point more than in 2007. A further 6 per cent was consumed within the energy industries, while 1 per cent was accounted for by distribution losses within the gas network. (For an explanation of the items included under losses, see paragraph 4.50). Of the remaining 58 per cent, 2 per cent was transformed into heat for sale to a third party, and 12 per cent was accounted for by the industrial sector, with the chemicals industry (excluding natural gas for petrochemical feedstocks), food, mineral products and paper making industries being the largest consumers. The chemicals sector accounted for over a quarter of the industrial consumption of natural gas.

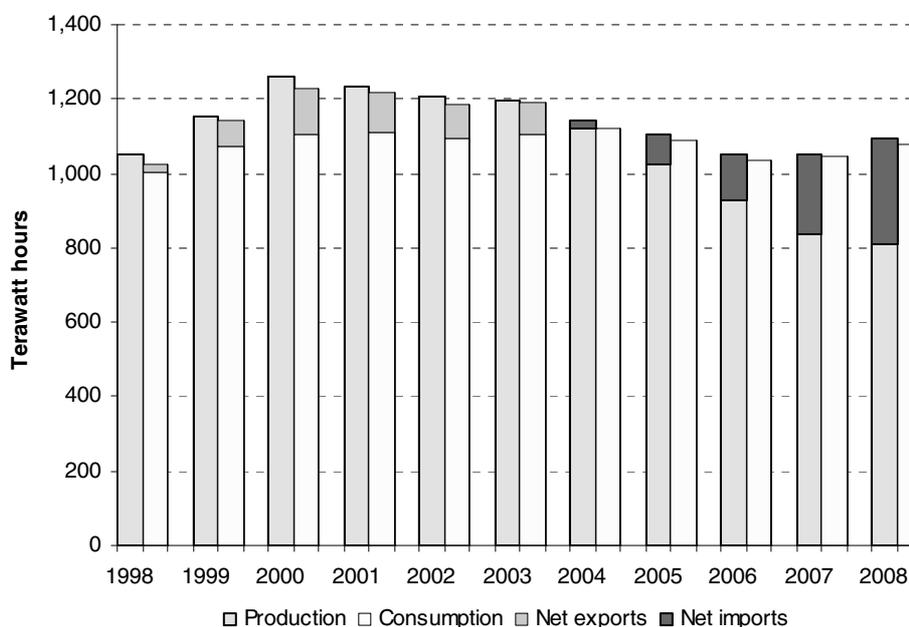
4.8 Sales of gas to households (domestic sector) accounted for 33 per cent of gas demand, while public administration (including schools and hospitals) consumed 4 per cent of total demand, which was more than was sold to the chemicals sector. The commercial, agriculture and miscellaneous sectors together took up 5 per cent. Non-energy use of gas accounted for the remaining 1 per cent. (See paragraph 4.40 for more details on non-energy use of gas).

4.9 Care should be exercised in interpreting the figures for individual industries in these commodity balance tables. As companies switch contracts between gas suppliers, it has not been possible to ensure consistent classification between and within industry sectors and across years. The breakdown of final consumption includes a substantial amount of estimated data. For 2008, the allocation of about 5 per cent of consumption is estimated.

Supply and consumption of natural gas and colliery methane (Table 4.2)

4.10 This table summarises the production and consumption of gas from these sources in the United Kingdom over the last five years. Chart 4.1 shows that indigenous production has been in decline since reaching a peak in 2000 and that the UK returned to being a net importer of gas in 2004, and has been in each year since.

Chart 4.1: Natural gas production, net exports/imports and consumption⁽¹⁾ 1998 to 2008

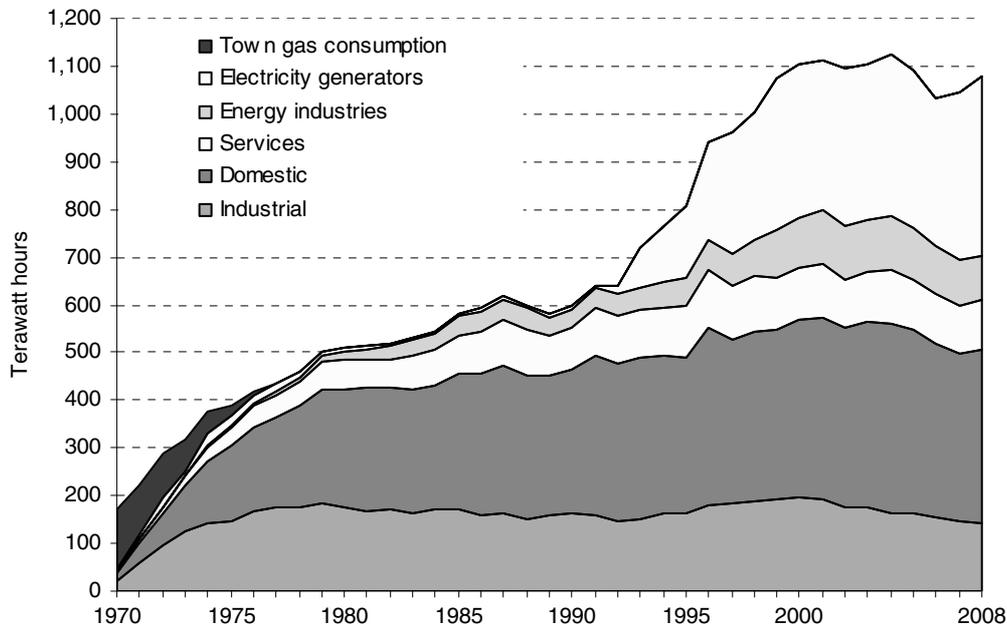


(1) Consumption plus net exports will differ from production plus net imports because of stock changes, losses and the statistical difference item.

4.11 As Chart 4.2 shows, the growth in consumption for electricity generation has dominated the growth in natural gas consumption over the last ten years. Most of this gas was used in Combined Cycle Gas Turbine (CCGT) stations. However, gas use for electricity generation has fluctuated with

changes in the relative price of coal and gas. In 2004, gas use for generation rose by 5 per cent, to 341 TWh, as newly built power stations came on stream. Gas use then fell by 3.5 per cent in 2005, as prices paid by generators rose substantially in the second half of the year. Prices continued to rise in 2006, leading to a further 5.9 per cent fall in gas use. In 2007, however, gas use by generators rose by 14 per cent and by a further 6.1 per cent in 2008 to 374 TWh. The transformation sector as a whole accounted for 36 per cent of gas demand in 2008, 1 percentage point more than in 2007.

Chart 4.2: Consumption of town gas and natural gas 1970 to 2008



4.12 Since 2000, industrial use of gas has been on a downward trend apart from a small recovery in 2003. In 2008, the decline continued across all major industrial sectors. Overall industrial demand fell by 2.0 per cent in 2008, from 135 TWh to 133 TWh. At the same time, there was a 5.7 per cent increase in gas used for heat that was then sold to other companies. If heat use and total industrial use are combined then the decrease in gas use in 2008 is 1.0 per cent. Use by the public administration sector was 6.3 per cent higher in 2008, at 47 TWh, while the commercial sector was 5.6 per cent higher, at 38 TWh. Consumption in the energy industries other than electricity (and heat) generation fell by 5.5 per cent on 2007 to 69 TWh.

4.13 Gas use in the domestic sector is particularly dependent on winter temperatures. Across the year, 2008 experienced lower average temperatures than in 2007. All of the winter months (January to March and October to December) were cooler than a year earlier, while April was the coldest since 2001. Despite domestic gas prices peaking, in real terms, in 2008, this colder weather was a key factor in a 2.9 per cent rise in domestic sector consumption on 2007, up from 353 TWh to 363 TWh.

4.14 Maximum daily demand for natural gas through the National Transmission System in winter 2008/2009 was 4,886 GWh on 6th January 2009. This total maximum daily demand was 6.5 per cent higher than the 2007/2008 level, but 1.6 per cent lower than January 2003's record level.

4.15 It is estimated that sales of gas supplied on an interruptible basis accounted for around 31 per cent of total gas sales in 2008, roughly 7.0 percentage points higher than in 2007.

Regional analysis

4.16 Table 4A gives the number of consumers with a gas demand below 73,200 kWh per year in 2007 and the total number of gas consumers. Regions are ranked according to the level of total gas sales from the highest in the North West to the lowest in Wales. The table covers customers receiving gas from the national transmission system. The below 73,200 kWh category covers both domestic

and small business customers, and it was this section of the market that was progressively opened up to competition between April 1996 and May 1998. Note that the data are for 2007, one year in arrears of the other data presented in this chapter, and exclude circa 24,000 customers not allocated to a government office region.

Table 4A: Consumption by gas customers by region in 2007

Government Office Region	Consumption by customers below 73,200 kWh (2,500 therms) annual demand		Consumption by all customers	
	Number of consumers (thousands)	Gas sales 2007 (GWh)	Number of consumers (thousands)	Gas sales 2007 (GWh)
North West	2,799	50,183	2,842	80,190
South East	3,052	54,319	3,104	77,573
Greater London	2,952	49,921	3,006	74,349
Yorkshire and the Humber	2,045	37,013	2,077	63,370
Scotland	1,834	34,469	1,865	59,590
West Midlands	2,035	35,695	2,067	56,198
East of England	1,954	34,168	1,984	53,076
East Midlands	1,676	29,878	1,701	46,290
South West	1,716	27,146	1,741	41,052
North East	1,063	19,453	1,078	31,086
Wales	1,073	18,837	1,088	30,938
Great Britain	22,224	391,441	22,575	614,093

Source: xoserve and the independent gas transporters

4.17 In December 2008, DECC published in *Energy Trends* and on its regional energy web site (www.decc.gov.uk/en/content/cms/statistics/regional/regional.aspx) gas consumption data at both regional and local level. The local level data are at "NUTS4" level (see article in December 2008 *Energy Trends* for definition) and the regional data at "NUTS1" level. Data for earlier years are presented on the web site but only 2007 data appear in the article. Domestic sector sales are shown separately from commercial and industrial sales, along with the numbers of consumers. DECC has now produced electricity and gas consumption estimates for 2007 at Middle Layer Super Output Area (MLSOA) level and, for Scotland, intermediate geography zones. MLSOAs are a statistical geography developed by the Office for National Statistics (ONS) as part of the 2001 census. There are 7,193 MLSOAs (plus the Isles of Scilly) which are areas containing a minimum population of 5,000 or around 2,000 households. In addition to this in Scotland there are 1,235 intermediate geography zones which are designed to contain between 2,500 and 6,000 people. Further details about the MLSOA data can be found on the DECC website at: www.decc.gov.uk/en/content/cms/statistics/regional/regional.aspx.

4.18 By December 2008, 12.4 million gas consumers (57 per cent) were no longer supplied by British Gas. Table 4B gives market penetration in more detail, by local distribution zone (LDZ). For all types of domestic customer, it is in the markets in Northern England and Wales that new suppliers have had most success. Since the market has opened up, British Gas had lost around 44 per cent of the credit market, 66 per cent of the direct debit market, and 52 per cent of the pre-payment market. Historically, British Gas's pre-payment prices have tended to be below the average of new suppliers; however, since 2004, this trend has reversed. At the end of May 2009, 40 suppliers were licensed to supply gas to domestic customers.

Table 4B: Domestic gas market penetration (in terms of percentage of customers supplied) by local distribution zone and payment type, fourth quarter of 2008

Region	British Gas Trading			Non-British Gas		
	Credit	Direct Debit	Prepayment	Credit	Direct Debit	Prepayment
Wales	52	35	33	48	65	67
Northern	45	26	35	55	74	65
Scotland	56	32	46	44	68	54
North West	59	36	60	41	64	40
East Midlands	55	33	54	45	67	46
Eastern	54	33	49	46	67	51
South East	56	34	48	44	66	52
Southern	52	31	45	48	69	55
North East	53	32	41	47	68	59
North Thames	63	43	56	37	57	44
South Western	56	36	41	44	64	59
West Midlands	64	37	61	36	63	39
Great Britain	56	34	48	44	66	52

4.19 For the non-domestic market, about three-quarters (by volume) in the United Kingdom was opened to competition at the end of 1982 and the remainder in August 1992 (with the reduction in the tariff threshold). However, no other suppliers entered the market until 1990. After 1990, there was a rapid increase in the number of independent companies supplying gas, although from 1999 there were signs of some consolidation and in recent years sales of gas have become more concentrated in the hands of the largest companies in the domestic, industrial and commercial sectors. This came about through larger companies absorbing smaller suppliers and through mergers between already significant suppliers. After an increase in competition in 2006 during a period of rising gas prices, competition in the domestic market remained broadly unchanged between 2006 and 2008, with the largest three suppliers accounting for 70 per cent of sales in 2008. In the industrial sector, after an increase in 2007, the market share of the three largest suppliers fell back to 60 per cent in 2008. The commercial sector is more competitive, with the three largest suppliers accounting for 43 per cent of sales in 2008.

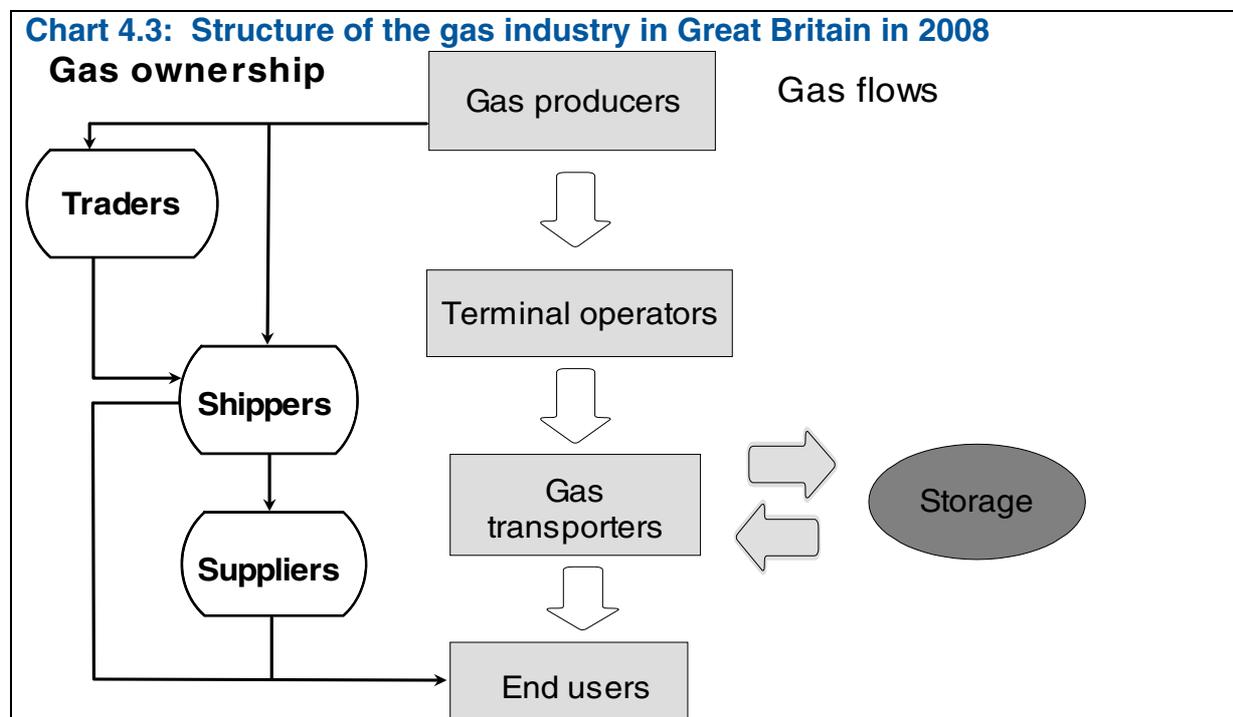
4.20 Following the 1995 Gas Act, the business of British Gas was fully separated into two corporate entities. The supply and shipping businesses were devolved to a subsidiary, British Gas Trading Limited, while the transportation business (Transco) remained within British Gas plc. In February 1997, Centrica plc was demerged from British Gas plc (which was itself renamed as BG plc) completing the division of the business into two independent entities. Centrica became the holding company for British Gas Trading, British Gas Services, the Retail Energy Centres and the company producing gas from the North and South Morecambe fields. BG plc comprised the gas transportation and storage business of Transco, along with British Gas's other exploration and production, international downstream, research and technology and property activities. In October 2000, BG plc demerged into two separately listed companies, of which Lattice Group plc was the holding company for Transco, while BG Group plc included the international and gas storage businesses. On 21 October 2002, Transco and the National Grid Company merged to form National Grid.

4.21 From 1 October 2001, under the Utilities Act, gas pipeline companies have been able to apply for their own national Gas Transporter Licences so that they can compete with Transco. In some areas, low pressure spur networks had already been developed by new transporters competing with Transco to bring gas supplies to new customers (mainly domestic). In addition, some very large loads (above 60 GWh) are serviced by pipelines operated independently, some by North Sea producers.

Northern Ireland

4.22 Before 1997, Northern Ireland did not have a public natural gas supply. The construction of a natural gas pipeline from Portpatrick in Scotland to Northern Ireland was completed in 1996 and provided the means of establishing such a system. The initial market was Ballylumford power station, which was purchased by British Gas in 1992 and converted from oil to gas firing (with a heavy fuel oil back up). A second gas-fired power station was built at Coolkeeragh in 2005. The onshore line has

been extended to serve wider industrial, commercial and domestic markets and this extension is continuing. In late 2007, the South-North gas pipeline was completed, to allow gas to be imported to Northern Ireland from the Republic of Ireland. In 2008, 79 per cent of all gas supplies in Northern Ireland were used to generate electricity. The structure of the gas industry in Great Britain, as it stood at the end of 2008, is shown in Chart 4.3.



UK continental shelf and onshore natural gas (Table 4.3)

4.23 Table 4.3 shows the flows for natural gas from production through transmission to consumption. The footnotes to the table give more information about each row. This table departs from the standard balance methodology and definitions in order to maintain the link with past data and with monthly data given on DECC's energy statistics web site (see paragraph 4.46). The relationship between total UK gas consumption shown in this table and total demand for gas given in the balance tables (4.1 and 4.2) is illustrated for 2008 as follows:

	GWh
Total UK consumption (Table 4.3)	1,009,873
<i>plus</i> Producers' own use	62,231
<i>plus</i> Operators' own use	<u>4,265</u>
<i>equals</i>	
"Consumption of natural gas"	1,076,369
<i>plus</i> Other losses and metering differences (upstream)	-
<i>plus</i> Downstream losses - leakage assessment	5,304
- own use gas	428
- theft	2,142
<i>plus</i> Metering differences (transmission)	<u>5,759</u>
<i>equals</i>	
Total demand for natural gas (Tables 4.1 and 4.2)	1,090,002

4.24 Gross production of natural gas rose steadily from the year indigenous production began in 1967 until it peaked in 2000 at 1.3 TWh. It has since fallen steadily as reserves on the UKCS deplete. In 2008, natural gas production was 36 per cent lower than the 2000 peak. Gas available at UK terminals has remained fairly constant over this period mainly due to the changes in exports and imports described in paragraph 4.15. Producers' and operators' own use of gas have tended to change in proportion to the volumes of gas produced and transmitted. Gas input into the transmission system increased by 4.5 per cent between 2007 and 2008, while output of natural gas rose 3.5 per

cent. Output from the transmission system was lower than input due to stock changes and metering differences.

4.25 For a discussion of the various losses and statistical difference terms in this table, see paragraphs 4.47 to 4.50 in the technical notes and definitions section below. The statistical difference between output from the National Transmission System and total UK consumption has been disaggregated using information obtained from Transco on leakage from local distribution zone pipes, theft and use regarded as own use by pipeline operators. The convention used is set out in paragraph 4.48.

4.26 Losses and metering differences attributable to the information provided on the upstream gas industry are zero from 2001 onwards because these data are no longer reported in the revised Petroleum Production Reporting System. This simplified system for reporting the production of crude oil, NGLs and natural gas in the UK was implemented from 1 January 2001; it reduced the burden on the respondents and improved the quality of data reported on gas production.

4.27 Table 4.3 also includes two rows showing gas stocks and gas storage capacity at the end of the year. Storage data are not currently available before 2004. Stocks data for 2005 onwards have been sourced from the National Grid's weekly brief, and storage data from its 2008 Ten Year Statement.

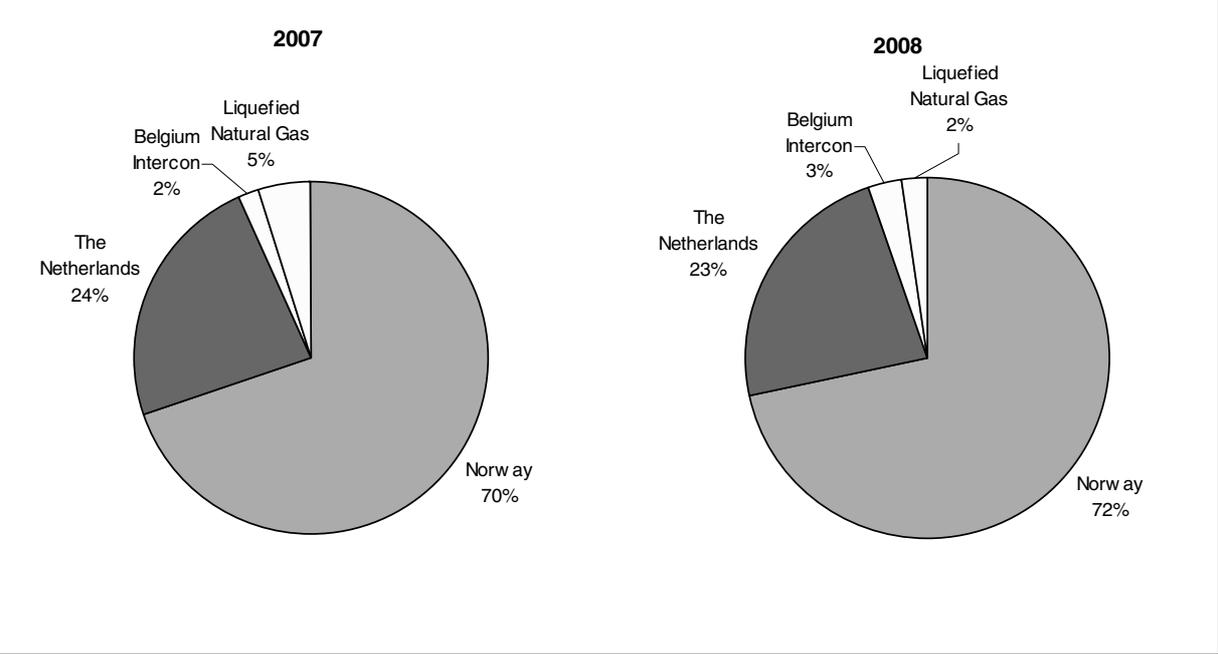
Gas storage sites and import/export pipelines (Table 4.4)

4.28 This table details current and planned gas storage facilities in the UK as at 31 May 2009, and also the two operational pipelines that bring gas to the UK from continental Europe. In addition, significant increases in storage capacity/deliverability are being planned or contemplated at existing or new sites, both onshore and offshore. National Grid's Gas Transportation Ten Year Statement (www.nationalgrid.com/uk/Gas/TYS/) includes public details of such projects.

Natural gas imports and exports (Table 4.5)

4.29 This table shows how much gas is imported to, and exported from, the UK, via the interconnector pipelines and LNG. In 2008, 72 per cent of the UK's gross gas imports were from Norway, up from 70 per cent in 2007. In 2008, 51 per cent of our gas exported was to continental Europe, and 49 per cent to the Republic of Ireland. Included for the first time is chart 4.4, which shows the shares of natural gas imports by interconnector pipelines and LNG, while the flows of gas across Europe are illustrated in Map 4.1.

Chart 4.4: Natural gas imports



The gas supply industry in Great Britain

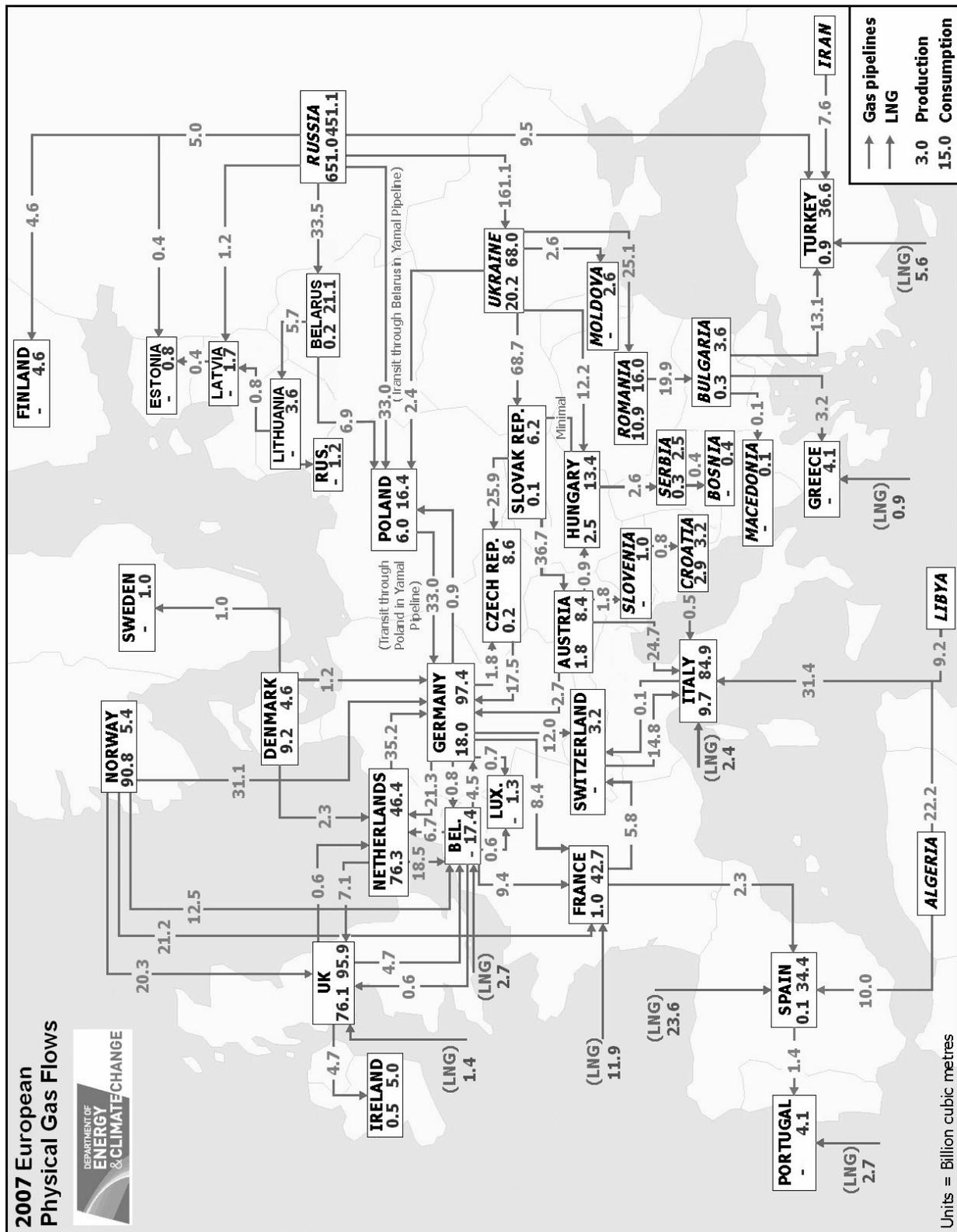
4.30 When British Gas was privatised in 1986, it was given a statutory monopoly over supplies of natural gas (methane) to premises taking less than 732,000 kWh (25,000 therms) a year. Under the Oil and Gas (Enterprise) Act 1982, contract customers taking more than this were able to buy their gas from other suppliers, but no other suppliers entered the market until 1990.

4.31 In 1991, the Office of Fair Trading (OFT) followed up an examination of the contract market, in 1988, by the Monopolies and Mergers Commission (MMC). It reviewed progress towards a competitive market, and found that the steps taken in 1988 had been ineffective in encouraging self-sustaining competition. British Gas undertook in March 1992: to allow competitors to take, by 1995, at least 60 per cent of the contract market above 732,000 kWh (25,000 therms) a year (subsequently redefined as 45 per cent of the market above 73,200 kWh (2,500 therms)); to release to competitors the gas necessary to achieve this; and to establish a separate transport and storage unit with regulated charges. In the 1992 Competition and Service (Utilities) Act, the Government also took powers to reduce or remove the tariff monopoly, and in July 1992 it lowered the tariff threshold to 73,200 kWh.

4.32 Difficulties in implementing the March 1992 undertakings led to further references to the MMC. As a result of the new recommendations made by the MMC earlier in 1993, the President of the Board of Trade decided in December 1993 to require full internal separation of British Gas's supply and transportation activities, but not divestment, and to accelerate removal of the tariff monopoly to April 1996, with a phased opening of the domestic market by the regulator over the following two years.

4.33 In November 1995, the Gas Bill received Royal Assent, clearing the way for the extension of competition into the domestic gas supply market on a phased basis between 1996 and 1998. This was carried out in stages between April 1996 and May 1998.

Map 4.1: Gas European Transit System



4.34 Gas data are less transparent at the wider European level given missing information on transit flows and incomplete trade information. The above map was produced using published International Energy Agency data to reconstruct the missing physical gas flow data and was prepared as part of DECC's contribution to a Eurostat project to improve gas data transparency and quality.

Technical notes and definitions

4.35 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1, paragraphs 1.26 to 1.60. For notes on the commodity balances and definitions of the terms used in the row headings see Annex A, paragraphs A.7 to A.42. While the data in the printed and bound copy of this Digest cover only the most recent 5 years, these notes also cover data for earlier years that are available on the DECC energy statistics web site.

Definitions used for production and consumption

4.36 **Natural gas** production in Tables 4.1 and 4.2 relates to the output of indigenous methane at land terminals and gas separation plants (includes producers' and processors' own use). For further explanation, see Annex F, paragraph F.10 on DECC's energy statistics web site under 'Production of gas' - www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx. Output of the Norwegian share of the Frigg and Murchison fields is included under imports. A small quantity of onshore produced methane (other than colliery methane) is also included.

4.37 Table 4.3 shows production, transmission and consumption figures for UK continental shelf and onshore natural gas. Production includes waste and own use for drilling, production and pumping operations, but excludes gas flared. Gas available in the United Kingdom excludes waste, own use for drilling etc, stock change, and includes imports net of exports. Gas transmitted (input into inland transmission systems) is after stock change, own use, and losses at inland terminals. The amount consumed in the United Kingdom differs from the total gas transmitted by the gas supply industry because of losses in transmission, differences in temperature and pressure between the points at which the gas is measured, delays in reading meters and consumption in the works, offices, shops, etc of the undertakings. The figures include an adjustment to the quantities billed to consumers to allow for the estimated consumption remaining unread at the end of the year.

4.38 **Colliery methane** production is colliery methane piped to the surface and consumed at collieries or transmitted by pipeline to consumers. As the output of deep-mined coal declines so does the production of colliery methane, unless a use can be found for gas that was previously vented. The supply of methane from coal measures that are no longer being worked or from drilling into coal measures is licensed under the same legislation as used for offshore gas production.

4.39 **Transfers** of natural gas include natural gas use within the iron and steel industry for mixing with blast furnace gas to form a synthetic coke oven gas. For further details see paragraph 2.43 in Chapter 2.

4.40 **Non-energy gas:** Non-energy use is gas used as feedstock for petrochemical plants in the chemical industry as raw material for the production of ammonia (an essential intermediate chemical in the production of nitrogen fertilisers) and methanol. The contribution of liquefied petroleum gases (propane and butane) and other petroleum gases is shown in Tables 3.2 to 3.4 of Chapter 3. Firm data for natural gas are not available, but estimates for 2004 to 2008 are shown in Table 4.2 and estimates for 2006 to 2008 in Table 4.1. The estimates for the years up to 2007 have been obtained from AEA's work for the National Atmospheric Emissions Inventory; 2008 data are DECC extrapolations.

Sectors used for sales/consumption

4.41 For definitions of the various sectors used for sales and consumption analyses see Chapter 1 paragraphs 1.54 to 1.58 and Annex A, paragraphs A.31 to A.42. However, **miscellaneous** has a wider coverage than in the commodity balances of other fuels. This is because some gas supply companies are unable to provide a full breakdown of the services sector and the gas they supply to consumers is allocated to miscellaneous when there is no reliable basis for allocating it elsewhere. See also paragraph 4.44, below, for information on the source of the sectoral data for consumption of gas.

Data collection

4.42 Production figures are generally obtained from returns made under DECC's Petroleum Production Reporting System (PPRS) and from other sources. DECC obtain data on the transmission of natural gas from National Grid (who operate the National Transmission System) and from other

pipeline operators. Data on consumption are based on returns from gas suppliers and UKCS producers who supply gas directly to customers.

4.43 The production data are for the United Kingdom (including natural gas from the UKCS - offshore and onshore). The restoration of a public gas supply to parts of Northern Ireland in 1997 (see paragraph 4.22), means that all tables in this chapter, except Tables 4A and 4B, cover the UK.

4.44 DECC carry out an annual survey of gas suppliers to obtain details of gas sales to the various categories of consumer. Estimates are included for the suppliers with the smallest market share since the DECC inquiry covers only the largest suppliers (ie those with more than about a 0.5 per cent share of the UK market up to 1997 and those known to supply more than 1,750 GWh per year for 1998 onwards). For 2000 and subsequent years, gas consumption for the iron and steel sector is based on data provided by the Iron and Steel Statistics Bureau (ISSB) rather than gas suppliers since gas suppliers were over estimating their sales to this sector. The difference between the ISSB and gas suppliers figures has been re-allocated to other sectors using the results of the Office for National Statistics' Purchases Inquiry and information derived from the EU Emissions Trading Scheme submissions.

Period covered

4.45 Figures generally relate to years ended 31 December. However, before 2004, data for natural gas for electricity generation relate to periods of 52 weeks as set out in Chapter 5, paragraphs 5.67 and 5.68.

Monthly and quarterly data

4.46 Monthly data on natural gas production and supply are available from DECC's energy statistics web site www.decc.gov.uk/en/content/cms/statistics/source/gas/gas.aspx in monthly Table 4.2. A quarterly commodity balance for natural gas (which includes consumption data) is published in DECC's quarterly statistical bulletin *Energy Trends* and is also available from quarterly Table 4.1 on DECC's energy statistics web site. See Annex C for more information about *Energy Trends* and DECC's energy statistics web site.

Statistical and metering differences

4.47 In Table 4.3 there are several headings that refer to statistical or metering differences. These arise because measurement of gas flows, in volume and energy terms, takes place at several points along the supply chain. The main sub-headings in the table represent the instances in the supply chain where accurate reports are made of the gas flows at that particular key point in the supply process. It is possible to derive alternative estimates of the flow of gas at any particular point by taking the estimate for the previous point in the supply chain and then applying the known losses and gains in the subsequent part of the supply chain. The differences seen when the actual reported flow of gas at any point and the derived estimate are compared are separately identified in the table wherever possible, under the headings statistical or metering differences.

4.48 The differences arise from several factors:-

- Limitations in the accuracy of meters used at various points of the supply chain. While standards are in place on the accuracy of meters, there is a degree of error allowed which, when large flows of gas are being recorded, can become significant.
- Differences in the methods used to calculate the flow of gas in energy terms. For example, at the production end, rougher estimates of the calorific value of the gas produced are used which may be revised only periodically, rather than the more accurate and more frequent analyses carried out further down the supply chain. At the supply end, although the calorific value of gas shows day-to-day variations, for the purposes of recording the gas supplied to customers a single calorific value is used. Until 1997 this was the lowest of the range of calorific values for the actual gas being supplied within each LDZ, resulting in a "loss" of gas in energy terms. In 1997 there was a change to a "capped flow-weighted average" algorithm for calculating calorific values resulting in a reduction in the losses shown in the penultimate row of Table 4.3. This change in algorithm, along with improved meter validation and auditing procedures, also reduced the level of the "metering differences" row within the downstream part of Table 4.3.
- Differences in temperature and pressure between the various points at which gas is measured. Until February 1997 British Gas used "uncorrected therms" on their billing system for tariff customers when converting from a volume measure of the gas used to an energy measure. This

made their supply figure too small by a factor of 2.2 per cent, equivalent to about 1 per cent of the wholesale market.

- Differences in the timing of reading meters. While National Transmission System meters are read daily, customers' meters are read less frequently (perhaps only annually for some domestic customers) and profiling is used to estimate consumption. Profiling will tend to underestimate consumption in a strongly rising market.
- Other losses from the system, for example theft through meter tampering by consumers.

4.49 The headings in Table 4.3 show where, in the various stages of the supply process, it has been possible to identify these metering differences as having an effect. Usually they are aggregated with other net losses as the two factors cannot be separated. Whilst the factors listed above can give rise to either losses or gains, losses are more common. However, the negative downstream gas metering difference within the transmission system in 2003 was an anomaly that was investigated by National Grid during 2004. They concluded that this unaccounted for element of National Transmission System shrinkage was due to an exceptional run of monthly negative figures between February and June 2003 within what is usually a variable but mainly positive series. However, after a comprehensive investigation of this exceptional period no causal factors were identified. It is probable that the meter error or errors that caused this issue were corrected during the validation of metering.

4.50 The box below shows how, in 2008, the wastage, losses and metering differences figures in Table 4.3 are related to the losses row in the balance Tables 4.1 and 4.2. It should be noted that losses from 2001 onwards are lower than in earlier years because figures for losses and metering differences in the upstream gas industry are no longer available (see above):

Table 4.3	GWh
Upstream gas industry:	
Other losses and metering differences	-
Downstream gas industry:	
Transmission system metering differences	5,759
Leakage assessment	5,304
Own use gas	428
Theft	<u>2,142</u>
Tables 4.1 and 4.2	
Losses	13,634

Similarly, the statistical difference row in Tables 4.1 and 4.2 is made up of the following components in 2008:

Table 4.3	GWh
Statistical difference between gas available from upstream and gas input to downstream	-939
<i>plus</i> Downstream gas industry:	
Distribution losses and metering differences	<u>1,815</u>
Tables 4.1 and 4.2	
Statistical difference	876

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Map 4.2: The National Gas Transmission System 2008



Source: International Energy Agency and DECC

4.1 Commodity balances

Natural gas

	2006			2007			2008		
	Natural gas	Colliery methane	Total Natural gas	Natural gas	Colliery methane	Total Natural gas	Natural gas	Colliery methane	Total Natural gas
Supply									
Production	929,784	754	930,538	838,092	717	838,809	809,649	635	810,284
Other sources	-	-	-	-	-	-	-	-	-
Imports	244,029	-	244,029	338,026	-	338,026r	407,054	-	407,054
Exports	-120,591	-	-120,591	-123,158	-	-123,158	-122,670	-	-122,670
Marine bunkers	-	-	-	-	-	-	-	-	-
Stock change (1)	-6,435	-	-6,435	+5,480	-	+5,480	-3,087	-	-3,087
Transfers (2)	-52	-	-52	-78	-	-78	-68	-	-68
Total supply	1,046,735	754	1,047,489	1,058,363r	717	1,059,080r	1,090,878	635	1,091,513
Statistical difference (3)	+2,044r	-	+2,044r	+945r	-	+945r	+876	-	+876
Total demand	1,044,692r	754	1,045,446r	1,057,418r	717	1,058,135r	1,090,002	635	1,090,637
Transformation	330,933r	595	331,528r	374,060r	586	374,646r	396,740	506	397,246
Electricity generation	308,910r	595	309,505r	352,151r	586	352,737r	373,578	506	374,084
Major power producers	278,149r	-	278,149r	319,848r	-	319,848r	341,057	-	341,057
Autogenerators	30,761r	595	31,356r	32,303r	586	32,889r	32,522	506	33,028
Heat generation	22,023	-	22,023	21,909r	-	21,909r	23,161	-	23,161
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Energy industry use	79,128r	112	79,240r	73,169r	91	73,260r	69,101	95	69,196
Electricity generation	-	-	-	-	-	-	-	-	-
Oil and gas extraction	70,138r	-	70,138r	65,305	-	65,305	62,231	-	62,231
Petroleum refineries	2,542r	-	2,542r	2,441r	-	2,441r	1,887	-	1,887
Coal extraction	-	112	112	-	91	91	-	95	95
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	611	-	611	719	-	719	718	-	718
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-	-
Other	5,837r	-	5,837r	4,703r	-	4,703r	4,265	-	4,265
Losses (4)	12,007r	-	12,007r	12,068	-	12,068	13,634	-	13,634
Final consumption	622,624r	47	622,671r	598,121r	40	598,161r	610,527	34	610,561
Industry	145,687r	47	145,734r	135,220r	40	135,260r	132,467	34	132,501
Unclassified	-	47	47	-	40	40	-	34	34
Iron and steel	8,406	-	8,406	7,311r	-	7,311r	6,818	-	6,818
Non-ferrous metals	3,206	-	3,206	3,392	-	3,392	3,303	-	3,303
Mineral products	12,802r	-	12,802r	11,216r	-	11,216r	11,091	-	11,091
Chemicals	39,043r	-	39,043r	36,767r	-	36,767r	35,974	-	35,974
Mechanical Engineering, etc	8,679	-	8,679	7,817r	-	7,817r	7,729	-	7,729
Electrical engineering, etc	4,123r	-	4,123r	3,940r	-	3,940r	3,897	-	3,897
Vehicles	9,270	-	9,270	8,841r	-	8,841r	8,635	-	8,635
Food, beverages, etc	27,779r	-	27,779r	26,172r	-	26,172r	25,913	-	25,913
Textiles, leather, etc	6,636	-	6,636	6,380	-	6,380	6,101	-	6,101
Paper, printing, etc	12,519r	-	12,519r	10,822r	-	10,822r	10,680	-	10,680
Other industries	10,667r	-	10,667r	9,881r	-	9,881r	9,743	-	9,743
Construction	2,555	-	2,555	2,683	-	2,683	2,583	-	2,583
Transport	-	-	-	-	-	-	-	-	-
Air	-	-	-	-	-	-	-	-	-
Rail	-	-	-	-	-	-	-	-	-
Road (5)	-	-	-	-	-	-	-	-	-
National navigation	-	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-	-
Other	469,024r	-	469,024r	452,673r	-	452,673r	468,788	-	468,788
Domestic	365,850r	-	365,850r	352,943r	-	352,943r	363,315	-	363,315
Public administration	48,816	-	48,816	44,486r	-	44,486r	47,288	-	47,288
Commercial	34,277	-	34,277	35,943	-	35,943	37,958	-	37,958
Agriculture	2,013	-	2,013	1,999	-	1,999	2,161	-	2,161
Miscellaneous	18,068r	-	18,068r	17,302r	-	17,302r	18,066	-	18,066
Non energy use	7,913r	-	7,913r	10,228r	-	10,228r	9,273	-	9,273

(1) Stock fall (+), stock rise (-).

(2) Natural gas used in the manufacture of synthetic coke oven gas.

(3) Total supply minus total demand.

(4) See paragraphs 4.47 to 4.50.

(5) See footnote 5 to Table 4.2.

4.2 Supply and consumption of natural gas and colliery methane⁽¹⁾

	GWh				
	2004	2005	2006	2007	2008
Supply					
Production	1,121,257	1,025,989	930,538	838,809	810,284
Imports	133,033	173,328	244,029	338,026r	407,054
Exports	-114,112	-96,181	-120,591	-123,158	-122,670
Stock change (2)	-6,235	+1,321	-6,435	+5,480	-3,087
Transfers	-39	-51	-52	-78	-68
Total supply	1,133,904	1,104,406	1,047,489	1,059,080r	1,091,513
Statistical difference (3)	+702	+3,152	+2,044r	+945r	+876
Total demand	1,133,202	1,101,255	1,045,446r	1,058,135r	1,090,637
Transformation	362,668	351,448	331,528r	374,646r	397,246
Electricity generation	340,824	328,960	309,505r	352,737r	374,084
Major power producers	304,497	295,643	278,149r	319,848r	341,057
Autogenerators	36,328	33,317	31,356r	32,889r	33,028
Heat generation	21,844	22,488	22,023	21,909r	23,161
Other	-	-	-	-	-
Energy industry use	88,468	86,273	79,240r	73,260r	69,196
Electricity generation	-	-	-	-	-
Oil and gas extraction	77,753	74,187	70,138r	65,305	62,231
Petroleum refineries	3,076	4,274	2,542r	2,441r	1,887
Coal extraction	150	114	112	91	95
Coke manufacture	-	-	-	-	-
Blast furnaces	728	941	611	719	718
Other	6,761	6,757	5,837r	4,703r	4,265
Losses (4)	8,207	10,964	12,007r	12,068	13,634
Final consumption	673,860	652,570	622,671r	598,161r	610,561
Industry	153,953	151,391	145,734r	135,260r	132,501
Unclassified	65	55	47	40	34
Iron and steel	9,715	8,469	8,406	7,311r	6,818
Non-ferrous metals	3,199	3,218	3,206	3,392	3,303
Mineral products	13,401	13,299	12,802r	11,216r	11,091
Chemicals	42,002	41,073	39,043r	36,767r	35,974
Mechanical engineering, etc	8,611	8,676	8,679	7,817r	7,729
Electrical engineering, etc	4,158	4,333	4,123r	3,940r	3,897
Vehicles	10,228	10,258	9,270	8,841	8,635
Food, beverages, etc	28,232	27,918	27,779r	26,172r	25,913
Textiles, leather, etc	7,120	7,130	6,636	6,380	6,101
Paper, printing, etc	13,879	13,687	12,519r	10,822r	10,680
Other industries	10,413	10,599	10,667r	9,881r	9,743
Construction	2,931	2,675	2,555	2,683	2,583
Transport	-	-	-	-	-
Road (5)	-	-	-	-	-
Other	509,886	491,500	469,024r	452,673r	468,788
Domestic	396,411	384,009	365,850r	352,943r	363,315
Public administration	51,934	50,319	48,816	44,486r	47,288
Commercial	37,595	35,097	34,277	35,943	37,958
Agriculture	2,355	2,261	2,013	1,999	2,161
Miscellaneous	21,591	19,814	18,068r	17,302r	18,066
Non energy use	10,021	9,678	7,913r	10,228r	9,273

(1) Colliery methane figures included within these totals are as follows:

	2004	2005	2006	2007	2008
Total production	810	757	754	717	635
Electricity generation	595	588	595	586	506
Coal extraction	150	114	112	91	95
Other industries	65	55	47	40	34
Total consumption	810	757	754	717	635

(2) Stock fall (+), stock rise (-).

(3) Total supply minus total demand.

(4) For an explanation of what is included under losses, see paragraphs 4.47 to 4.50.

(5) A small amount of natural gas is consumed by road transport, but gas use in this sector is predominantly of petroleum gas, hence road use of gas is reported in the petroleum products balances in Chapter 3.

4.3 UK continental shelf and onshore natural gas production and supply(1)

	GWh				
	2004	2005	2006	2007	2008
Upstream gas industry:					
Gross production (2)	1,120,447	1,025,232	929,784	838,092	809,649
Minus Producers' own use (3)	77,753	74,187	70,138r	65,305	62,231
Exports	114,112	96,181	120,591	123,158	122,670
Plus Imports of gas	133,033	173,328	244,029	338,026r	407,054
Gas available at terminals (4)	1,061,615	1,028,192	983,084r	987,655r	1,031,803
Minus Statistical difference (5)	-2,310	-1,329	-740r	-1,030r	-939
Downstream gas industry:					
Gas input into the national transmission system (6)	1,063,926	1,029,521	983,824	988,686	1,032,742
Minus Operators' own use (7)	6,560	6,555	5,831	4,698	4,265
Stock change (storage sites) (8)	+6,235	-1,321	+6,435	-5,480	3,087
Metering differences (5)	137	1,230	4,544	4,472	5,759
Gas output from the national transmission system (9)	1,050,994	1,023,057	967,014	984,996	1,019,631
Minus Leakage assessment (10)	5,433	5,291	5,027r	5,117	5,304
Own use gas (11)	439	427	406	413	428
Theft (12)	2,194	2,137	2,030r	2,066	2,142
Transfers (13)	39	51	52	51	51
Statistical difference and metering differences (5)	3,016	6,359	2,783r	2,002r	1,833
Total UK consumption (14)	1,039,873	1,008,792	956,716r	975,347r	1,009,873
Stocks of gas (at end year)	36,800	35,479	41,914	36,434	39,521
Storage capacity (15)	45,309	47,971r	48,126r	48,126r	47,530

(1) For details of where to find monthly updates of natural gas production and supply see paragraph 4.46.

(2) Includes waste and producers' own use, but excludes gas flared.

(3) Gas used for drilling, production and pumping operations.

(4) The volume of gas available at terminals for consumption in the UK as recorded by the terminal operators. The percentage of gas available for consumption in the UK from indigenous sources in 2008 was 72 per cent, compared with 78 per cent in 2007.

(5) Measurement of gas flows, in volume and energy terms, occurs at several points along the supply chain. As such, differences are seen between the actual recorded flow through any one point and estimates calculated for the flow of gas at that point. More detail on the reasons for these differences is given in the technical notes and definitions section of this chapter, paragraphs 4.47 to 4.50.

(6) Gas received as reported by the pipeline operators. The pipeline operators include National Grid, who run the national pipeline network, and other pipelines that take North Sea gas supplies direct to consumers.

(7) Gas consumed by pipeline operators in pumping operations and on their own sites.

(8) Stocks of gas held in specific storage sites, either as liquefied natural gas, pumped into salt cavities or stored by pumping the gas back into an offshore field. Stock rise (+), stock fall (-).

(9) Including public gas supply, direct supplies by North Sea producers, third party supplies and stock changes.

(10) This is a National Grid assessment of leakage through the local distribution system based on the National Leakage Reduction Monitoring Model.

(11) Equivalent to about 0.06 per cent of LDZ throughput, this is an assessment of the energy used to counter the effects of gas cooling on pressure reduction.

(12) Calculated by National Grid as 0.3 per cent of LDZ throughput, this is theft before the gas reaches customer meters.

(13) Transfers are the use within the iron and steel industry for the manufacture of synthetic coke oven gas.

(14) See paragraph 4.23 for an explanation of the relationship between these "Total UK consumption" figures and "Total demand" shown within the balance tables.

(15) Data compiled by DECC from individual storage site information. Converted from billion cubic metres to GWh assuming 11.02 kWh per cubic metre. See paragraph 4.27.

4.4 Gas storage sites and import/export pipelines in the United Kingdom at 31 May 2009

Owner	Site	Location	Capacity (Billion m3)	Max flow rate (Million m3/day)	Type	Status (1)
Operational storage						
Centrica Storage Ltd	Rough	Southern North Sea	3.34	43	Depleted field	Long
National Grid	Avonmouth	Bristol	0.08	13	LNG	Short
	Glenmavis	North Lanarkshire	0.05	8	LNG	Short
	Partington	Manchester	0.05	14	LNG	Short
Scottish and Southern Energy	Hornsea	East Yorkshire	0.33	18	Salt cavern	Medium
Energy Merchants Gas Storage	Holehouse Farm	Cheshire	0.04	8	Salt cavern	Medium
Scottish Power	Hatfield Moor	South Yorkshire	0.12	2	Depleted field	Medium
Star Energy Ltd	Humbly Grove	Hampshire	0.30	7	Depleted field	Medium

Pipeline	Owner	Between	Max flow rate (Million m3/day)
Operational pipelines			
Imports			
Bacton-Zeebrugge Interconnector	Interconnector (UK) Limited	Zeebrugge and Bacton	72
BBL Pipeline	BBL Company	Balgzand and Bacton	41
Vesterled Pipeline	Gassco	Heimdal Riser Platform and St Fergus	36
Tampen Link	Gassco	Links Statfjord to FLAGS (terminating at St Fergus)	18
Langeled Pipeline	Norsk Hydro	Nyhamna and Easington	74
Exports			
Bacton-Zeebrugge Interconnector	Interconnector (UK) Limited	Bacton and Zeebrugge	55
UK- Irish Gas Interconnector	Bord Gais	Moffat and Ireland	30

(1) Long range, medium range or short range storage. Status is determined both by capacity size and injection, deliverability and storage re-cycling rates.

4.5 Natural gas imports and exports ⁽¹⁾

	GWh				
	2004	2005	2006	2007	2008
Imports from:					
Belgium (2)	25,592	24,108	30,505	6,471	12,174
The Netherlands (3)	-	-	9,135	76,602	90,563
Norway (4)	95,359	127,895	157,035	225,764	283,722
Liquefied Natural Gas (5)	-	5,453	37,576	14,903	8,912
Total Imports	120,951	157,456	234,251	323,740	395,371
Exports to:					
Belgium (2)	60,060	36,641	60,195	51,390	45,949
The Netherlands (6)	2,887	4,261	3,371	6,358	10,389
Norway (7)	-	-	-	153	389
Republic of Ireland (8)	39,084	39,407	47,247	50,972	54,260
Total Exports	102,031	80,309	110,813	108,873	110,987
Net Imports (9)	18,920	77,147	123,438	214,867	284,384

(1) This table is also shown as Table G.6 of the Internet Annex G of the Digest.

(2) Physical flows of gas through the Bacton-Zeebrugge Interconnector. In tables 4.1 to 4.3 the nominated flows of gas through the pipeline are used. Nominated flows are the amounts of gas that companies requested be supplied through the pipeline. Net imports are the same whichever measurement is used.

(3) Via the Bacton-Balgzand (BBL) pipeline. Commissioned in November 2006.

(4) Currently via the Langeled and Vesterled pipelines, and the Tampen Link (from Statfjord to FLAGS). Prior to 2005 includes the Norwegian share of the Frigg field.

(5) From various sources to the Isle of Grain and Gasport Teesside.

(6) Direct exports from the Grove, Chiswick, Markham, Minke and Windermere offshore gas fields using the Dutch offshore gas pipeline infrastructure.

(7) With effect from September 2007, UK gas from the Blane field to the Norwegian Ula field for injection into the Ula reservoir.

(8) Includes gas to the Isle of Man for which separate figures are not available.

(9) A negative figure means the UK was a net exporter of gas.



Chapter 5

Electricity

Introduction

5.1 This Chapter presents statistics on electricity from generation through to sales, and it includes statistics on generating capacity, fuel used for generation, load factors and efficiencies, and a map showing the transmission system in Great Britain and the location of the main power stations (page 127). An energy flow chart for 2008, showing the flows of electricity from fuel inputs through to consumption, is included, overleaf. This is a way of simplifying the figures that can be found in the commodity balance for electricity in Table 5.1. It illustrates the flow of primary fuels from the point at which they become available for the production of electricity (on the left) to the eventual final use of the electricity produced or imported (on the right) as well as the energy lost in conversion, transmission and distribution.

5.2 Commodity balances for electricity, for each of the last three years, form the introductory table (Table 5.1). The supply and consumption elements of the electricity balance are presented as 5-year time series in Table 5.2. Table 5.3 separates out the public distribution system for electricity from electricity generated and consumed by autogenerators and uses a commodity balance format. Fuels used to generate electricity in the United Kingdom in each of the last five years are covered in Table 5.3

Table 5.5 shows the relationship between the commodity balance definitions and traditional Digest definitions for electricity, so that the most recent data can be linked to the long term trends data, which can be found on the DECC energy statistics web site. Table 5.6 shows the relationship between fuels used, generation and supply in each of the latest five years. Tables on plant capacity (Tables 5.7, 5.8 and 5.9) and on plant loads and efficiency (Table 5.10) have been included. Two of these contain data at a sub-national level. Table 5.11 lists individual power stations in operation and is supplemented by a table showing large scale Combined Heat and Power (CHP) schemes in the United Kingdom (Table 5.12). The long term trends commentary and tables on fuel use, generation, supply and consumption back to 1970 are to be found on DECC's energy statistics web site and accessible from the Digest of UK Energy Statistics home page:

www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

Inclusion of major wind farm operators in Major Power Producer statistics

5.3 This year, major wind farm operators have been included under Major Power Producers (MPPs, see paras 5.50 to 5.52 for definition), for 2007 onwards, in the monthly, quarterly, and annual tables of electricity statistics produced by DECC. Until now, all generation using wind turbines has been excluded from the MPP classification. This was because originally such generation was by small independent companies and collecting data on a monthly basis was prohibitively costly and unnecessarily burdensome on such companies.

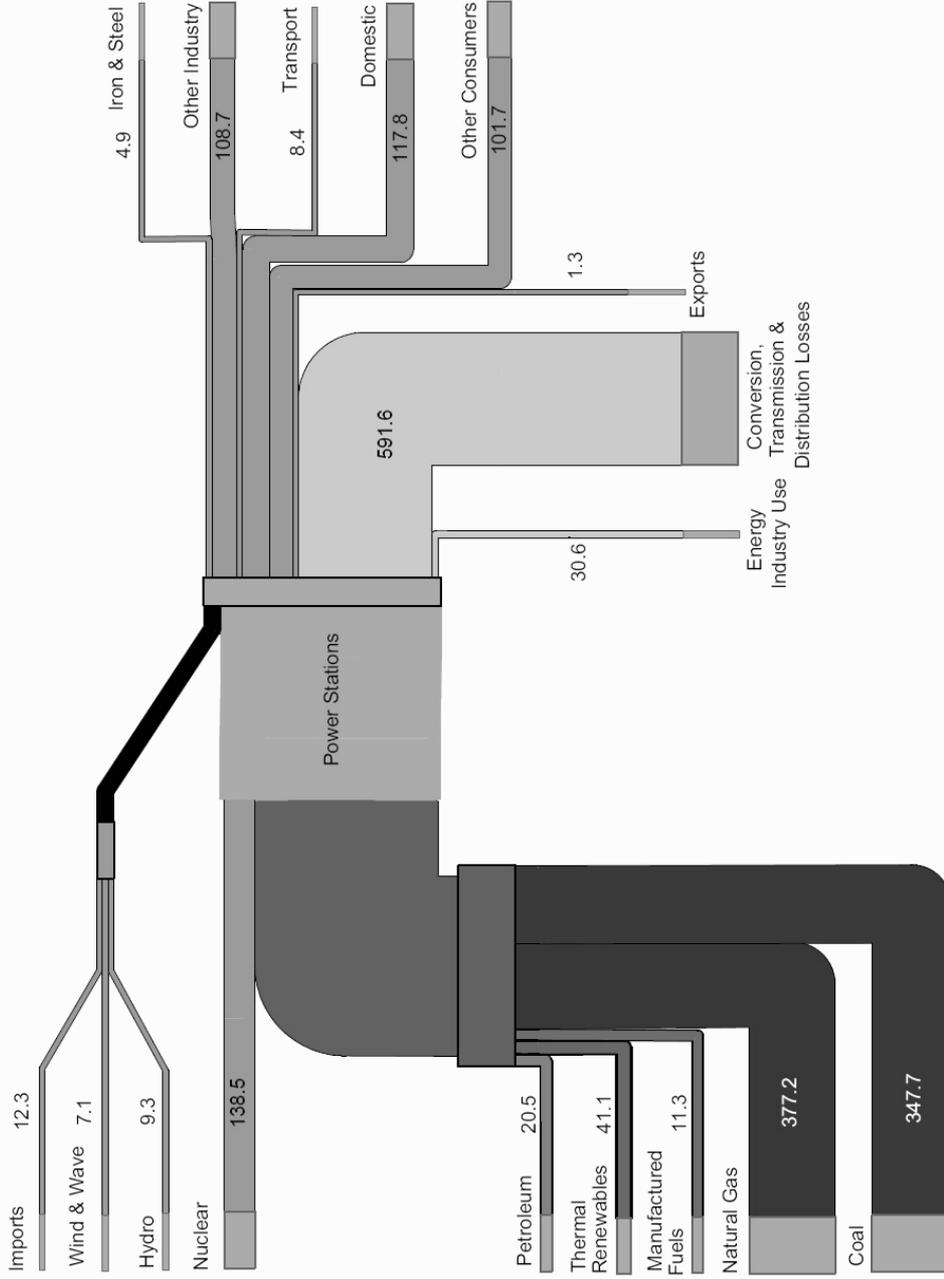
5.4 Generation from wind has now become more concentrated in the hands of larger companies and DECC has extended its system of monthly data collection to cover the largest wind power companies. The intention is that, in future, any company whose wind generation capacity increases to above 90 MW will be asked to provide monthly data for generation from wind and thus be included in the list of Major Power Producers.

5.5 The inclusion of major wind farm operators under Major Power Producers affects the majority of the electricity tables in DUKES, with figures for MPPs and the public distribution system increased, and other generators reduced for 2007 and 2008.

Commodity balances for electricity (Table 5.1)

5.6 The first page of this two page balance table shows that, in 2008, of total supply of 401 TWh, just over 97 per cent of UK electricity supply was home produced and just under 3 per cent was from imports net of exports, a slight rise on 2007 due to increased imports and lower exports. Just 0.3 per cent of home produced electricity was exported. The statistical difference term shows the difference between total supply and total demand. Of total demand, 31 TWh (8 per cent) was used within the

Electricity flow chart 2008 (TWh)



Notes:
 This flow chart is based on the data in Tables 5.1 (for imports, exports, use, losses and consumption) and 5.6 (fuel used).
 (1) Includes solar photovoltaics.
 (2) Hydro includes generation from pumped storage while electricity used in pumping is included under Energy Industry Use.

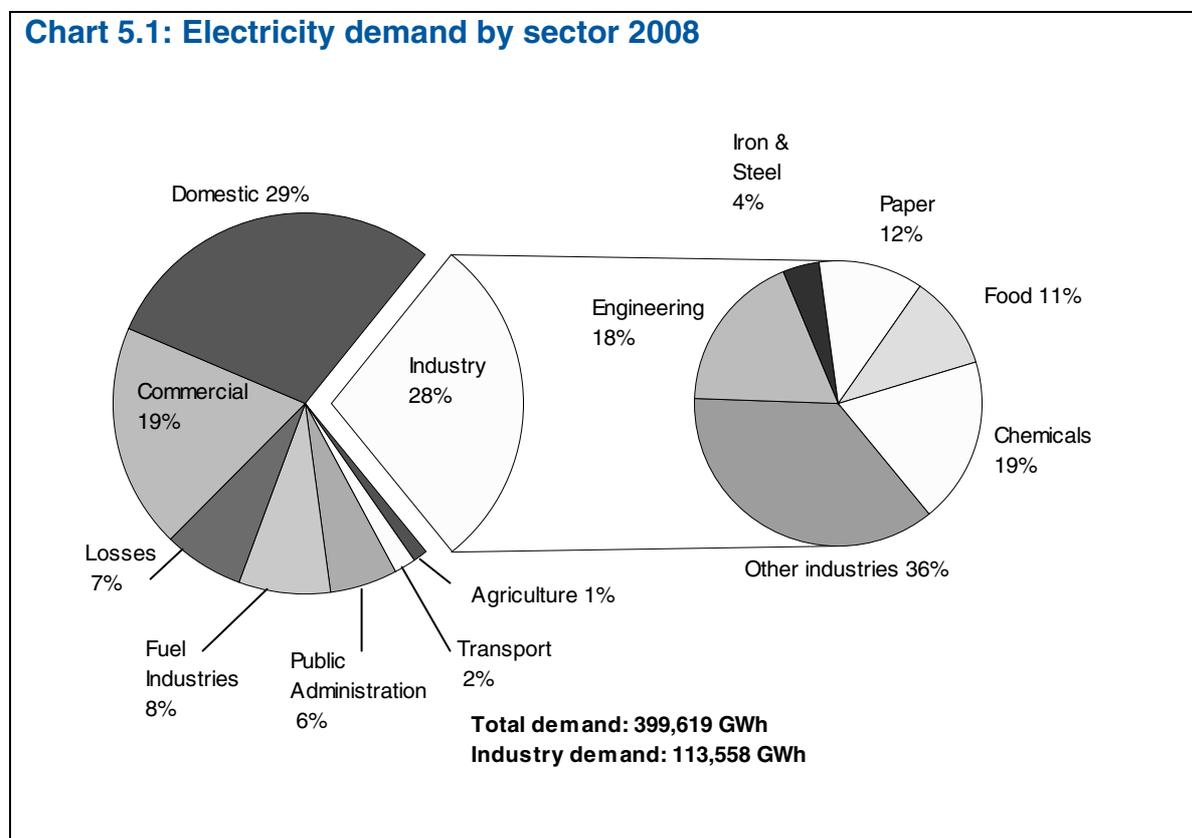
energy industry, 27 TWh (7 per cent) was accounted for by losses, and 342 TWh (85 per cent) was final consumption.

5.7 The second page of the balance shows that of the 386 TWh produced (excluding pumped storage production), 91 per cent was from major power producers and 9 per cent from other generators, while 17 per cent was from primary sources and 83 per cent from secondary sources.

5.8 Electricity generated by each type of fuel is also shown on the second page of the commodity balance table. The link between electricity generated and electricity supplied is made in Table 5.6 and electricity supplied by each type of fuel is illustrated in Chart 5.2. Paragraph 5.28 examines further the ways of presenting each fuel's contribution to electricity production.

5.9 Overall demand fell by 0.4 per cent, from 401 TWh in 2007 to 400 TWh in 2008. In contrast, domestic demand rose by 2.4 per cent, from 115 TWh to 118 TWh, reversing the change seen between 2006 and 2007. Demand in the Commercial, Public administration and Agriculture sectors has remained fairly stable over the past three years.

5.10 Industrial consumption was 33 per cent of final consumption in 2008 (28 per cent of total demand for electricity, which also includes losses and energy industry's use), marginally less than the consumption by households (35 per cent), with transport, storage and communications and the services sector accounting for the remaining 32 per cent. Within the industrial sector the three largest consuming industries are chemicals, paper and food, which together account for 41 per cent of industrial consumption. Taken together, the engineering industries accounted for a further 18 per cent of industrial consumption of electricity. The iron and steel sector is also a substantial user of electricity but part of its consumption is included against blast furnaces and coke ovens under energy industry uses. This is because electricity is used by coke ovens and blast furnaces in the transformation of solid fuels into coke, coke oven gas and blast furnace gas. A note on the estimates included within these figures is to be found at paragraph 5.71. Chart 5.1 shows diagrammatically the total demand for electricity in 2008.



5.11 The transport sector covers electricity consumed by companies involved in transport, storage and communications. Within the overall total of 8,434 GWh, it is known that national railways consumed about 2,900 GWh each year for traction purposes, and this figure has been shown separately in the balances.

5.12 The electricity industry itself uses 53 per cent of the energy industries' total use of electricity. This does not include the 18 per cent of energy industry use accounted for by pumping at pumped storage stations. Petroleum refineries are the next most significant consumer with 17 per cent of energy industry use.

5.13 The losses item has three components:

- transmission losses from the high voltage transmission system, which represented about 23 per cent of the figure in 2008,
- distribution losses, which occur between the gateways to the public supply system's network and the customers' meters, and accounted for about 73 per cent of losses,
- theft or meter fraud (around 4 per cent) (see paragraph 5.74).

Supply and consumption of electricity (Table 5.2)

5.14 There was a 0.4 per cent decrease in the supply of electricity in 2008. This follows on from similar falls in 2007 and 2006, which was the first year on year fall in supply since 1997. Production (including pumped storage production) fell by 1.9 per cent in 2008, while imports of electricity net of exports were over double that in 2007. This large increase was mainly driven by a 70 per cent increase in net imports from continental Europe, which accounted for 99 per cent of imports to the UK in 2008. 2008 also saw a fall in net exports to the Republic of Ireland, which accounted for 29 per cent of UK exports in 2008. An analysis of electricity flows across Europe was carried out by DECC in 2007 using data published by the International Energy Agency and Eurostat. This was published in *Energy Trends*, March 2008¹. (See Annex C for more information about *Energy Trends*).

5.15 Losses as a proportion of electricity demand in 2008, at 6.9 per cent, were slightly higher than in 2007 (6.6 per cent). Energy industry use as a proportion of total demand, at 7.7 per cent, was also slightly lower than in 2007 (8.3 per cent). Although total supply of electricity fell in 2008 compared to 2007, lower energy industry use meant there was slightly more electricity available for final consumption.

5.16 Industrial consumption of electricity was 2.9 per cent lower than in 2007, and consumption in the services sector was 0.5 per cent higher. Domestic sector consumption of electricity was 2.4 per cent higher than in 2007. Consumption by transport, storage and communications was 4.1 per cent higher than in 2007. Temperatures influence the actual level of consumption in any one year in the winter months, as customers adjust heating levels in their homes and businesses. In addition, the hot summers of 2003 and 2006 led to an increased use of electricity for air conditioning and cooling. 2006 had a cold first quarter, a hot third quarter and a mild fourth quarter which combined to give an average temperature during the year that was the warmest since 2002. 2007 had particularly mild first and second quarters but a cool third quarter so on average the year was cooler than 2006. Despite a warmer third quarter than the previous year, 2008 was a cold year, with the average temperature across the year the lowest since 1996, with the final quarter the coldest since 1993. However, 2008 as a whole was warmer than the long term, 1971-2000, average.

¹ www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx

Regional electricity data

5.17 The collection of data relating to regional and local consumption of electricity began in autumn 2004 and regional and local data on electricity consumption were published on an experimental basis in December of that year. The exercise has been repeated in each year since and the resulting statistics are no longer experimental having been granted “National Statistics” status in 2008. For details of the availability of local level electricity (and gas) data see Chapter 4, paragraph 4.16 and the regional statistics pages of the DECC energy statistics web site:

www.decc.gov.uk/en/content/cms/statistics/regional/regional.aspx

A summary of electricity consumption at regional level is given in Table 5A and relates to 2007.

5.18 The difference between total UK electricity sales, shown in Table 5A, and total UK electricity sales shown in Table 5.5 is small (1,522 GWh or 0.5 per cent). This mainly arises from the fact that the regional data are not based exactly on a calendar year. In Table 5A, the regions are ranked according to the level of total electricity sales from the highest in the Greater London to the lowest in the North East.

Table 5A: Electricity sales 2007

	Domestic sector sales (GWh)	Number of domestic customers (thousand) (1)	Industrial and commercial sector sales (GWh)	Number of I & C customers (thousand) (1)	All consumers sales (GWh)
Greater London	13,774	3,310	28,423	413	42,197
South East	16,981	3,581	23,806	333	40,787
North West	13,139	3,109	22,214	243	35,353
Scotland	12,001	2,721	16,961	225	28,962
East of England	11,934	2,489	16,324	217	28,257
West Midlands	10,407	2,348	16,558	200	26,965
South West	11,039	2,337	15,228	243	26,267
Yorkshire and the Humber	9,377	2,298	16,083	179	25,459
East Midlands	8,5178	1,957	14,120	161	22,637
Wales	5,399	1,303	11,234	124	16,633
North East	4,430	1,184	8,912	82	13,342
Unallocated Consumption	128	33	2,681	15	2,810
Sales direct from high voltage lines (2)					7,300
Great Britain	117,126	26,670	192,543	2,435	309,670
Northern Ireland (3)					8,550
Total (4)					325,519

(1) Figures are the number of Meter Point Administration Numbers (MPANs); every metering point has this unique reference number.

(2) Based on estimate provided by Ofgem.

(3) Northern Ireland data are based on data for electricity distributed provided by Northern Ireland Electricity.

(4) This is close to the figure for UK electricity sales in 2007 of 327,041 GWh shown in Table 5.5; see paragraph 5.21.

5.19 Since May 1999, all of the domestic electricity market in Great Britain has been open to competition. By December 2008, 14 million electricity consumers (53 per cent) were no longer with their home supplier. Table 5B gives market penetration in the fourth quarter of 2008. By the end of 2008, the home suppliers (i.e. the former regional electricity companies) had lost 49 per cent of the credit, 63 per cent of the direct debit, and 51 per cent of the prepayment market. However, as Table 5B shows there is considerable regional variation with much higher retention in Northern Scotland and South Wales.

Table 5B: Domestic electricity market penetration (in terms of percentage of customers supplied) by Public Electricity Supply area and payment type, fourth quarter of 2008

Region	Home Supplier			Non-Home Supplier		
	Credit	Direct Debit	Prepayment	Credit	Direct Debit	Prepayment
North West	43	28	33	57	72	67
East Midlands	45	35	38	55	65	62
West Midlands	42	29	36	58	71	64
Merseyside and North Wales	48	37	48	52	63	52
Eastern	48	35	37	52	65	63
Yorkshire	44	32	39	56	68	61
North East	44	31	29	56	69	71
South East	53	31	53	47	69	47
London	55	34	56	45	66	44
Southern Scotland	51	43	57	49	57	43
South West	58	30	56	42	70	44
Southern	65	49	58	35	51	42
South Wales	70	59	86	30	41	14
Northern Scotland	77	64	78	23	36	22
Great Britain	51	37	49	49	63	51

Commodity balances for the public distribution system and for other generators (Table 5.3)

5.20 Table 5.3 expands on the commodity balance format to show consumption divided between electricity distributed over the public distribution system and electricity provided by other generators (largely autogeneration and generation from renewable sources). Autogeneration is the generation of electricity wholly or partly for a company's own use as an activity which supplements its primary activity. However, many generators of electricity from renewable sources (apart from large scale hydro, most wind and some biofuels) are included as other generators because of their comparatively small size, even though their main activity is electricity generation. For a full list of companies included as major power producers see paragraph 5.58.

5.21 The proportion of electricity supplied by generators other than major power producers fell slightly in 2008 to 8.6 per cent. The proportion of this electricity transferred to the public distribution system in 2008 was 29 per cent, an increase of around 4 percentage points on 2007.

5.22 Table 5.3 also expands both the domestic sector to show consumption by payment type and the commercial sector to show detailed data beyond that presented in Tables 5.1 and 5.2.

5.23 In 2008, 5 per cent of final consumption of electricity was by other generators and did not pass over the public distribution system. This was much the same proportion as in 2007. A substantial proportion of electricity used in the energy industries is self-generated (above 16 per cent in all three years shown in the table). At petroleum refineries the proportion is even higher and in 2008, 71 per cent of electricity was self-generated.

5.24 In 2008, 14 per cent of the industrial demand for electricity was met by autogeneration. Table 1.9 in Chapter 1 shows the fuels used by autogenerators to generate this electricity within each major sector and also the quantities of electricity generated and consumed.

5.25 Within the domestic sector, the amount of electricity consumed, reported as being purchased under some form of off-peak pricing structure was 31 per cent, about the same as the previous year. Seventeen per cent of consumption was through prepayment systems, about the same proportion as in the two previous years.

Fuel used in generation (Table 5.4)

5.26 In this table fuel used by electricity generators is measured in both original units and for comparative purposes, in the common unit of million tonnes of oil equivalent. In Table 5.6 figures are quoted in a third unit, namely GWh, in order to show the link between fuel use and electricity generated.

5.27 The energy supplied basis defines the primary input (in million tonnes of oil equivalent, Mtoe) needed to produce 1 TWh of hydro, wind, or imported electricity as:

$$\text{Electricity generated (TWh)} \times 0.085985$$

The primary input (in Mtoe) needed to produce 1 TWh of nuclear electricity is similarly

$$\frac{\text{Electricity generated (TWh)} \times 0.085985}{\text{Thermal efficiency of nuclear stations}}$$

In the United Kingdom the thermal efficiency of nuclear stations has risen in stages from 32 per cent in 1982 to rest around the 38 per cent mark in the last six years (see Table 5.10 and paragraph 5.66 for the definition)². The factor of 0.085985 is the energy content of one TWh divided by the energy content of one million tonnes of oil equivalent (see page 221 and inside back cover flap).

5.28 Figures on fuel use for electricity generation can be compared in two ways. Table 5.4 illustrates one way by using the volumes of **fuel input** to power stations (after conversion of inputs to an oil equivalent basis), but this takes no account of how efficiently that fuel is converted into electricity. The fuel input basis is the most appropriate to use for analysis of the quantities of particular fuels used in electricity generation (eg to determine the additional amount of gas or other fuels required as coal use declines under tighter emissions restrictions). A second way uses the amount of electricity generated and supplied by each fuel. This **output** basis is appropriate for comparing how much, and what percentage, of electricity generation comes from a particular fuel. It is the most appropriate method to use to examine the dominance of any fuel and for diversity issues. Percentage shares based on fuel outputs reduce the contribution of coal and nuclear, and increase the contribution of gas (by over 6 percentage points in 2008) compared with the fuel input basis. This is because of the higher conversion efficiency of gas. This output basis is used in Chart 5.3, taking electricity supplied (gross) figures from Table 5.6. Trends in fuel used on this electricity supplied basis are described in the section on Table 5.6, in paragraphs 5.31 to 5.34, below.

5.29 A historical series of fuel used in generation on a consistent, energy supplied, fuel input basis is available at Table 5.1.1 on DECC's energy statistics web site and accessible from the Digest of UK Energy Statistics home page:

www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

Relating measurements of supply, consumption and availability (Table 5.5)

5.30 Table 5.5 shows the relationship between these terms for the latest five years. For the full definitions of the terms used in the commodity balances see the Annex A, paragraphs A.7 to A.42.

Electricity generated and supplied (Table 5.6)

5.31 The main data on generation and supply in Table 5.6 are presented by type of fuel. There also remains an interest in the type of station and so the final part of the table shows generation from conventional steam stations and from combined cycle gas turbine stations over the most recent five years.

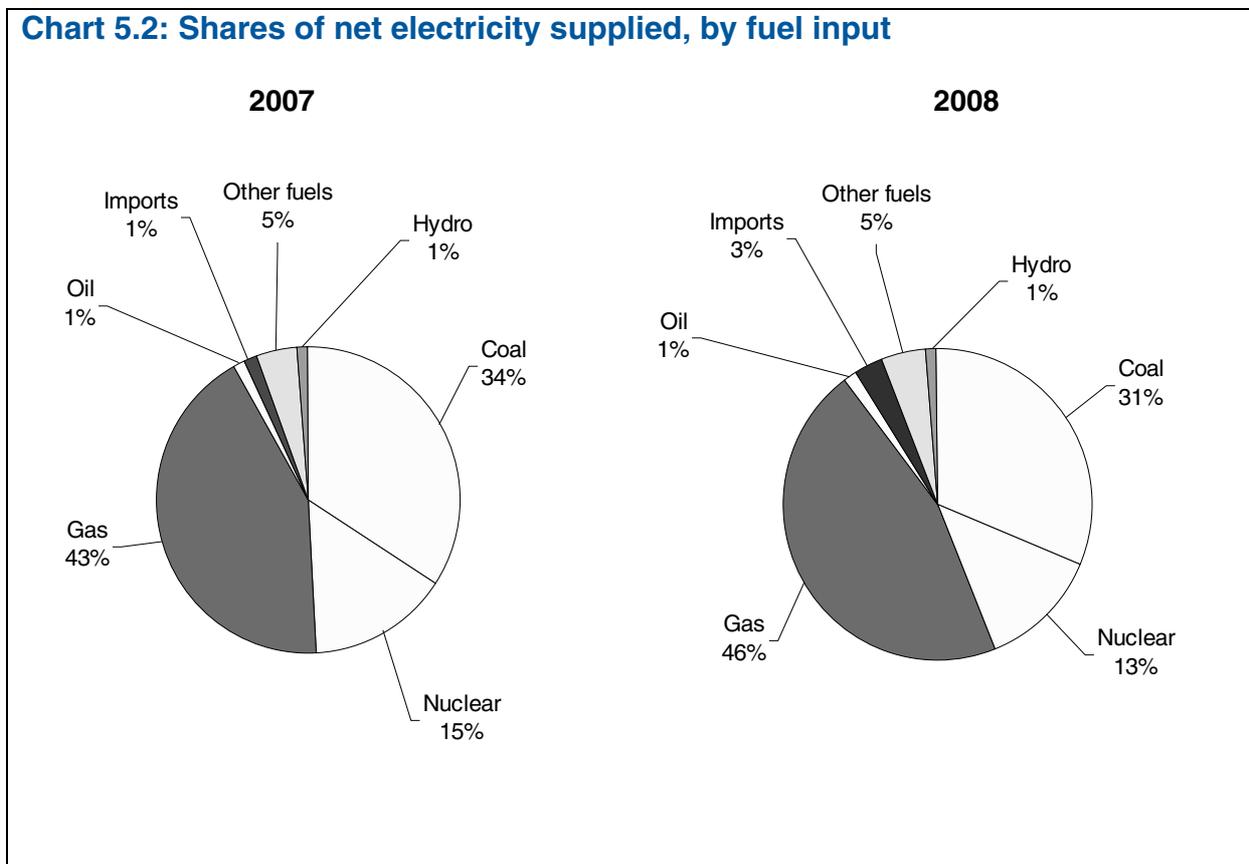
5.32 Total electricity generated in the United Kingdom in 2008 was 390 TWh, 1.9 per cent lower than generation in 2007. Major power producers (MPPs, as defined in paragraph 5.57) accounted for 91 per cent of electricity generation in 2008. Generation by MPPs was down 1.7 per cent on 2007, at 355 TWh, while by other generators was 3.6 per cent down on a year earlier, at 34 TWh.

² Note that the International Energy Agency uses 0.33 in its calculations, which is the European average thermal efficiency of nuclear stations in 1989, measured in net terms rather than the UK's gross terms.

5.33 Generation from coal was 8.2 per cent lower in 2008 than in 2007, at 125 TWh. At 177 TWh, generation from gas in 2008 was 6.6 per cent higher than in 2007, the previous record level of 166 TWh. Generation from nuclear sources fell by 17 per cent to 52 TWh, with the nuclear sector again affected by a high level of outages for repairs and maintenance.

5.34 Table 5.6 also shows electricity supplied data. These data take into account the fact that some stations use relatively more electricity than others in the generation process itself. In total, electricity supplied (gross) was 1.6 per cent less than in 2007. For gas-fired stations it was 6.8 per cent more, while for nuclear stations it was 17 per cent less. Chart 5.2 shows how shares of the generation market in terms of electricity output have changed since 2007. Gas's share of electricity supplied (net) plus imports in 2008, at 46 per cent, was 3 percentage points higher than in 2007, the previous record high. Coal's share at 31 per cent was 3 percentage points less than in 2007 and 6 percentage points lower than in 2006. Nuclear's 13 per cent share in 2008 was 2 percentage points lower than in 2007, and at its lowest since 1981. Wind's share increased from 1.4 per cent in 2007 to 1.9 per cent in 2008. Oil's share increased from 1.1 per cent to 1.4 per cent, while imports' share has risen to 3 per cent in 2008, the highest since 2000.

Chart 5.2: Shares of net electricity supplied, by fuel input



Plant capacity (Tables 5.7, 5.8 and 5.9)

5.35 Table 5.7 shows capacity, ie the maximum power available at any one time, for major power producers and other generators by type of plant.

5.36 As in the last two year's Digests, for major power producers capacities at the end of December 2008, December 2007 and December 2006 are all measured in Transmission Entry Capacity (TEC) terms. A full definition is given in the Technical Notes section at paragraph 5.63. The effect of this change has been to increase the capacity of major power producers by about 2,000 GWh in total with the majority of fossil fuel stations increasing their capacity under the TEC measurement but some decreasing.

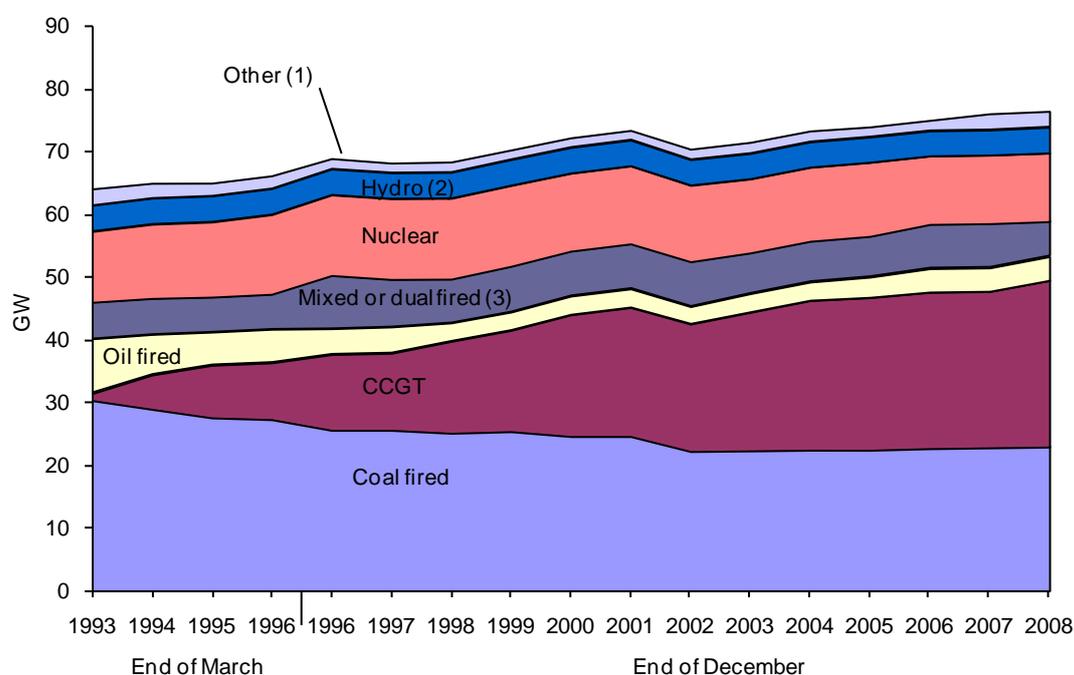
5.37 In 2008, there was an increase of 398 MW in the capacity of major power producers to 76,450 MW. The main contributory factors were an increase of over 160 MW of wind capacity, as well as a

new large-scale hydro station in Scotland. In addition there was a net increase from more minor up-ratings and down-ratings. In December 2008, major power producers accounted for 93 per cent of the total generating capacity, the same proportion as at the ends of December 2007. The capacity of other generators fell by 35 MW (-0.6 per cent), despite an almost doubling of wind capacity. Total capacity increased from 81,909 MW to 82,272 MW.

5.38 A breakdown of the capacity of the major power producers' plants at the end of March each year from 1993 to 1996 and at the end of December for 1996 to 2008 is shown in Chart 5.3.

5.39 Table 5.8 separates the capacities of major power producers geographically to show England and Wales, Scotland and Northern Ireland. So as not to disclose data for individual stations that have been provided in confidence, the breakdowns by type of station cannot be given in as much detail as in Table 5.7. In 2008, 83 per cent of the generating capacity in the UK owned by major power producers was in England and Wales, 14 per cent was in Scotland and 3 per cent in Northern Ireland. Out of the net increase in UK capacity of 398 MW in 2008, 287 MW was in Scotland, 237 MW was in Northern Ireland, while England and Wales saw a net fall of 125 MW.

Chart 5.3: Generating capacity of major power producers 1993-2008



(1) Gas turbines, oil engines and renewables other than hydro.

(2) Natural flow and pumped storage.

(3) Includes gas fired stations that are not CCGTs

5.40 In Table 5.9, data for the generating capacity of industrial, commercial and transport undertakings are shown, according to the industrial classification of the generator. In 2008, 16 per cent of the capacity was in the chemicals sector. Oil and gas terminals and oil refineries had just over 14 per cent of capacity, Paper, printing and publishing had an 11 per cent share, and engineering and other metal trades had just under a 9 per cent share. In 2008, 39 per cent of capacity was outside the industrial sector. The total capacity of 'Other Generators' fell in 2007 as the capacity of major wind farm operators are now included under Major Power Producers (see paragraph 5.3). Last year, the classification of CHP schemes was changed so schemes were classified according to the sector that receives the majority of the heat (as opposed to the sector in which the CHP operator was considered to operate). Data for years 2005 to 2008 are all on the new basis but there are some discontinuities between 2004 and 2005 (see DUKES 2008 Chapter 6 paragraphs 6.19, 6.33 and Table 6J).

Plant loads, demand and efficiency (Table 5.10)

5.41 Table 5.10 shows the maximum load met each year, load factors (by type of plant and for the system in total) and indicators of thermal efficiency. Maximum demand figures cover the winter period ending the following March. In 2004, maximum demand figures for England and Wales, Scotland, and Northern Ireland are shown separately. With the advent of BETTA (see paragraph 5.50), England, Wales and Scotland are covered by a single network and a single maximum load is shown for Great Britain for 2005 to 2008.

5.42 Maximum demand in the UK during the winter of 2008/2009 occurred in January 2009. At 60,289 MW, this was 2.0 per cent lower than the previous winter's maximum in December 2007. Maximum demand in 2008/2009 was 79 per cent of the UK capacity of major power producers (as shown in Table 5.7) as measured at the end of December 2008, down from 81 per cent in 2007/2008. Both these percentages are lower than the percentages for earlier years, in part due to the definitional change to TEC explained in paragraph 5.38. In Great Britain maximum demand in January 2009 was 79 per cent of the England, Wales and Scotland capacity of major power producers (Table 5.8) compared with 81 per cent for winter 2007/08. For Northern Ireland the proportion was 74 per cent (80 per cent in 2007/08). These percentages do not include the capacities available via the interconnectors with neighbouring grid systems nor demand for electricity via these interconnectors.

5.43 Plant load factors measure how intensively each type of plant has been used. The trend up to the end of the 1990s had been for conventional thermal plant to be used less intensively and CCGT stations more intensively. From 2000, increased maintenance and repair at nuclear stations (and initially at CCGT stations), and a rising trend in gas prices led to a departure from this trend. The load factor of nuclear stations in 2008 at 49.4 per cent was 30.7 percentage points below the recent peak load factor of 80.1 per cent in 1998. Very high gas prices in 2006 resulted in a particularly low CCGT load factor but this recovered in 2007 and 2008 to levels higher than those of 3 or 4 years earlier. More intensive use of coal fired stations saw their plant load factor rise to 69.4 per cent in 2006, but these fell back to 62.7 per cent in 2007 and then to 56.7 in 2008, with the implementation of the Large Combustion Plant Directive restricting their use.

5.44 2003, and to a lesser extent, 2006 were particularly dry years, especially in some areas where hydro electricity is produced. As a result the load factors for natural flow hydro show falls in those years (a substantial fall in 2003). Conversely the wetter year of 2007 saw a greater use of large scale hydro plant. 2008 saw a slight fall in load factor, as the increase in capacity was not quite matched by the increase in generation. Pumped storage use is less affected by the dry weather and high electricity prices encouraged its use from 2006 to 2008. The lower availability of hydro was another contributory factor to the high load factors for conventional thermal in 2003 and 2006.

5.45 Thermal efficiency measures the efficiency with which the heat energy in fuel is converted into electrical energy. The efficiency of coal-fired stations had been on a downward trend as coal became the marginal fuel for generation, but coal's increased role since 2000 has halted the decline in the thermal efficiency of coal-fired generation. CCGT efficiency fell back slightly in 2006 and 2007, but increased strongly in 2008 to almost 52 per cent. The efficiency of nuclear stations has been on a rising trend in recent years as older, less efficient stations have closed and this trend continued into 2007. However, outages have tended to counteract these efficiency gains in some years, including 2008. The efficiencies presented in this table are calculated using **gross** calorific values to obtain the energy content of the fuel inputs. If **net** calorific values are used, efficiencies are higher, for example CCGT efficiencies rise by about 5 percentage points.

Power stations in the United Kingdom (Tables 5.11 and 5.12)

5.46 Table 5.11 lists the operational power stations in the United Kingdom as at the end of May 2009 along with their installed capacity and the year they began to generate electricity. Where a company operates several stations the stations are grouped together. In general the table aims to list all stations of 1 MW installed capacity or over. On the DECC energy web site this table is also available in database format so stations can be grouped according to fuel, region, or age. Digest Table 5.12 adds to the information in Table 5.11. It shows CHP schemes of 1 MW and over for which the information is publicly available, but it is the total power output of these stations that is given, not just that which is classed as good quality CHP under the CHP Quality Assurance programme (CHPQA,

see Chapter 6), since CHPQA information for individual sites is not publicly available. In Table 5.11, generating stations using renewable sources are also listed in aggregate form in the “Other power stations” section apart from hydro stations and wind farms operated by the major power producers, which appear in the main table. For completeness CHP stations not appearing in the main table are also listed in aggregate in this section. Details of the interconnectors between England and France, Scotland and Northern Ireland and Northern Ireland and the Irish Republic are also given in this table. The total installed capacity of all the power stations individually listed in Table 5.11 is 78,835 MW.

Carbon dioxide emissions from power stations.

5.47 It is estimated that carbon dioxide emissions from power stations accounted for 32 per cent of the UK’s total carbon dioxide emissions in 2007. Emissions vary by type of fuel used to generate the electricity and emission estimates for all electricity generation for 2006 to 2008 are shown in Table 5C below:

Table 5C: Estimated carbon dioxide emissions from electricity generation 2006 to 2008

Fuel	Emissions (tonnes of carbon dioxide per GWh electricity supplied)		
	2006	2007	2008
Coal	912	915	910
Oil	670	620	711
Gas	412	397	393
All fossil fuels	666	626	605
All fuels (including nuclear and renewables)	510	496	497

Structure of the industry

5.48 Up to March 2005 the electricity industries of Scotland, Northern Ireland and England and Wales operated independently although interconnectors joined all three grid systems together. From April 2005 under the British Electricity Trading and Transmission Arrangements (BETTA), introduced in the Energy Act 2004, the electricity systems of England and Wales and Scotland have been integrated. The paragraphs below describe the position up to March 2005 but indicate the further changes that have been made under BETTA.

5.49 From the period immediately after privatisation of the industry in 1990, when there were seven generating companies in England and Wales and 12 Regional Electricity Companies distributing and supplying electricity to customers in their designated area, there were many structural and business changes and residual floatations. At the end of 2008, there were 32 major power producers operating in Great Britain³. Competition developed in mainland Britain as follows:

- (a) From 1 April 1990, customers with peak loads of more than 1 MW (about 45 per cent of the non-domestic market) were able to choose their supplier.
- (b) From 1 April 1994, customers with peak loads of more than 100 kW were able to choose their supplier.
- (c) Between September 1998 and May 1999, the remaining part of the electricity market (ie below 100 kW peak load) was opened up to competition. Paragraph 5.19 and Table 5B give more details of the opening up of the domestic gas and electricity markets to competition.

5.50 Since the late 1990s, there have been commercial moves toward vertical re-integration between generating, electricity distribution and/or electricity supply businesses. Those mergers that have taken place were approved by the relevant competition authority. Initially the National Grid Company was owned by the 12 privatised regional electricity companies, but was floated on the Stock Exchange in 1995. National Grid (and its predecessors since 1990) has owned and operated the high voltage transmission system in England and Wales linking generators to distributors and some large customers. This transmission system is linked to the transmission system of continental Europe via an interconnector to France under the English Channel (see Table 5.11). Up to March 2005, the Scottish

³ Some of these producers are joint ventures and so the number of generating companies involved is less than 32.

transmission system was regarded as being linked to that in England and Wales by two interconnectors but under BETTA National Grid took on responsibility for operating the transmission system in Scotland as well as England and Wales. Thus a single Great Britain market has been created and the transmission network is regarded as a single system.

5.51 In Scotland, until the end of March 2005, the two main companies, Scottish Power and Scottish and Southern Energy, covered the full range of electricity provision. They operated generation, transmission, distribution and supply businesses. In addition, there were a number of small independent hydro stations and some independent generators operating fossil-fuelled stations, which sold their output to Scottish Power and Scottish and Southern Energy.

5.52 The electricity supply industry in Northern Ireland has been in private ownership since 1993 with Northern Ireland Electricity plc (NIE) (part of the Viridian Group) responsible for power procurement, transmission, distribution and supply in the Province. Generation is provided by three private sector companies who own the four major power stations. In December 2001, the link between Northern Ireland's grid and that of Scotland was inaugurated. A link between the Northern Ireland grid and that of the Irish Republic was re-established in 1996, along which electricity is both imported and exported. However, on 1 November 2007 the two grids were fully integrated and a joint body SEMO (Single Electricity Market Operator) was set up by SONI (System Operator for Northern Ireland) and Eirgrid from the Republic to oversee the new single market.

5.53 In March 2001, the means of trading electricity changed with the introduction in England and Wales of the New Electricity Trading Arrangements (NETA). This replaced the Electricity Pool of England and Wales. These arrangements were based on bi-lateral trading between generators, suppliers, traders and customers. They were designed to be more efficient and provide greater choice for market participants, whilst maintaining the operation of a secure and reliable electricity system. The system included forwards and futures markets, a balancing mechanism to enable National Grid, as system operator, to balance the system, and a settlement process. In April 2005 this system was extended to Scotland under BETTA.

The Electricity Supply System in Great Britain in 2008



This map has been adapted from a map provided by Reed Business Publishing and National Grid; it is available in colour on the DECC energy website. Wind farms are now shown on the map in the Renewables Chapter (Page 190 of Chapter 7).

Technical notes and definitions

5.54 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1, paragraphs 1.26 to 1.59. For notes on the commodity balances and definitions of the terms used in the row headings see Annex A, paragraphs A.7 to A.42. While the data in the printed and bound copy of this Digest cover only the most recent 5 years, these notes also cover data for earlier years that are available on the DECC energy statistics web site.

Electricity generation from renewable sources

5.55 Figures on electricity generation from renewable energy sources are included in the tables in this section. Further detailed information on renewable energy sources is included in Chapter 7.

Combined heat and power

5.56 Electricity generated from combined heat and power (CHP) schemes, CHP generating capacities and fuel used for electricity generation are included in the tables in this chapter. However, more detailed analyses of CHP schemes are set out in Chapter 6.

Generating companies

5.57 Following the restructuring of the electricity supply industry in 1990, the term "Major generating companies" was introduced into the electricity tables to describe the activities of the former nationalised industries and distinguish them from those of autogenerators and new independent companies set up to generate electricity. The activities of the autogenerators and the independent companies were classified under the heading "Other generating companies". In the 1994 Digest, a new terminology was adopted to encompass the new independent producers, who were then beginning to make a significant contribution to electricity supply. Under this terminology, all companies whose prime purpose is the generation of electricity are included under the heading "Major power producers" (or MPPs). The term "Other generators" ("Autogenerators" in the balance tables) is restricted to companies who produce electricity as part of their manufacturing or other commercial activities, but whose main business is not electricity generation. "Other generators" also covers generation by energy services companies at power stations on an industrial or commercial site where the main purpose is the supply of electricity to that site, even if the energy service company is a subsidiary of a major power producer. The definition of major power producers has been amended this year to include major wind farm companies, but this change only applies to data for 2007 and 2008. Most generators of electricity from renewable sources (apart from large scale hydro, large scale wind and some biofuels) are also included as "Other generators" because of their comparatively small size, even though their main activity is electricity generation.

5.58 Major power producers at the end of 2008 were:

AES Electric Ltd., Baglan Generation Ltd., Barking Power Ltd., British Energy plc., Centrica Energy, Coolkeeragh ESB Ltd., Corby Power Ltd., Coryton Energy Company Ltd., Derwent Cogeneration Ltd., Drax Power Ltd., EDF Energy plc., E.On UK plc., Energy Power Resources, Gaz De France, GDP Suez Teesside Power Ltd., Immingham CHP, International Power Mitsui, Magnox Electric Ltd., Premier Power Ltd., RGS Energy Ltd, Rocksavage Power Company Ltd., RWE Npower plc., Scottish Power plc., Scottish and Southern Energy plc., Seabank Power Ltd., SELCHP Ltd., Spalding Energy Company Ltd., Uskmouth Power Company, Western Power Generation Ltd.

5.59 Additionally, the following major wind farm companies are included, beginning with data for 2007:

Airtricity, Cumbria Wind Farms, Fred Olsen, HG Capital, Renewable Energy Systems, Vattenfall Wind Power.

Generation from wind farms owned or operated by the following major power producers that had previously been excluded from the major power producer category are now included for 2007 and 2008:

Centrica Energy, E.On UK plc, RWE Npower plc, Scottish Power plc, Scottish and Southern Energy plc.

Types of station

5.60 The various types of station identified in the tables of this chapter are as follows:

Conventional steam stations are stations that generate electricity by burning fossil fuels to convert water into steam, which then powers steam turbines.

Nuclear stations are also steam stations but the heat needed to produce the steam comes from nuclear fission.

Gas turbines use pressurised combustion gases from fuel burned in one or more combustion chambers to turn a series of bladed fan wheels and rotate the shaft on which they are mounted. This then drives the generator. The fuel burnt is usually natural gas or gas oil.

Combined cycle gas turbine (CCGT) stations combine in the same plant gas turbines and steam turbines connected to one or more electrical generators. This enables electricity to be produced at higher efficiencies than is otherwise possible when either gas or steam turbines are used in isolation. The gas turbine (usually fuelled by natural gas or oil) produces mechanical power (to drive the generator) and waste heat. The hot exhaust gases (waste heat) are fed to a boiler, where steam is raised at pressure to drive a conventional steam turbine that is also connected to an electrical generator.

Natural flow hydro-electric stations use natural water flows to turn turbines.

Pumped storage hydro-electric stations use electricity to pump water into a high level reservoir. This water is then released to generate electricity at peak times. Where the reservoir is open, the stations also generate some natural flow electricity; this is included with natural flow generation. As electricity is used in the pumping process, pumped storage stations are net consumers of electricity.

Wind farms use wind flows to turn turbines.

Other stations include stations burning fuels such as landfill gas, sewage sludge, biomass and waste.

Public distribution system

5.61 This comprises the grid systems in England and Wales, Scotland and Northern Ireland. In April 2005 the Scotland and England and Wales systems were combined into a single grid.

Sectors used for sales/consumption

5.62 The various sectors used for sales and consumption analyses are standardised across all chapters of the 2009 Digest. For definitions of the sectors see Chapter 1 paragraphs 1.54 to 1.58 and Annex A paragraphs A.31 to A.42.

Transmission Entry Capacity, Declared Net Capacity and Installed Capacity

5.63 Transmission Entry Capacity (TEC) is a Connection and Use of System Code term that defines a generator's maximum allowed export capacity onto the transmission system. In the generating capacity statistics of the 2007 Digest, it replaced Declared Net Capacity (DNC) as the basis of measurement of the capacity of Major Power Producers from 2006. Declared Net Capacity is the maximum power available for export from a power station on a continuous basis minus any power generated or imported by the station from the network to run its own plant. It represents the nominal maximum capability of a generating set to supply electricity to consumers. The maximum rated output of a generator (usually under specific conditions designated by the manufacturer) is referred to as its Installed Capacity. For the nuclear industry, the World Association of Nuclear Operators (WANO) recommends that capacity of its reactors is measured in terms of Reference Unit Power (RUP) and it is the RUP figure that is given as the installed capacity of nuclear stations.

5.64 DNC is used to measure the maximum power available from generating stations that use renewable resources. For wind and tidal power and small scale hydro a factor is applied to declared net capability to take account of the intermittent nature of the energy source (eg 0.43 for wind and 0.365 for small scale hydro).

Load factors

5.65 The following definitions are used in Table 5.10:

Maximum load – Twice the largest number of units supplied in any consecutive thirty minutes commencing or terminating at the hour.

Simultaneous maximum load met – The maximum load on the grid at any one time. From 2005 (following the introduction of BETTA – see paragraph 5.5) it is measured by the sum of the maximum load met in Great Britain and the load met at the same time in Northern Ireland. Prior to 2005 it was measured by the sum of the maximum load met in England and Wales and the loads met at the same time by companies in other parts of the United Kingdom. In 2008/09 the maximum load in Great Britain occurred on 6 January 2009 at the half hour period ending 17:30 (58,590 MW). However, in Northern Ireland the maximum load occurred on 14 January 2009 at the period ending 17: 20 (1,738 MW), which was a new record, and 1.6 per cent above that of the previous winter. In Great Britain the highest ever load met was 60,118 MW on 10 December 2002.

Plant load factor – The average hourly quantity of electricity supplied during the year, expressed as a percentage of the average output capability at the beginning and the end of year.

System load factor – The average hourly quantity of electricity available during the year expressed as a percentage of the maximum demand nearest the end of the year or early the following year.

Thermal efficiency

5.66 Thermal efficiency is the efficiency with which heat energy contained in fuel is converted into electrical energy. It is calculated for fossil fuel burning stations by expressing electricity generated as a percentage of the total energy content of the fuel consumed (based on average gross calorific values). For nuclear stations it is calculated using the quantity of heat released as a result of fission of the nuclear fuel inside the reactor. The efficiency of CHP systems is discussed separately in Chapter 6, paragraph 6.23 and 6.24 and Table 6D. Efficiencies based on gross calorific value of the fuel (sometimes referred to as higher heating values or HHV) are lower than the efficiencies based on net calorific value (or lower heating value LHV). The difference between HHV and LHV is due to the energy associated with the latent heat of the evaporation of water products from the steam cycle which cannot be recovered and put to economic use.

Period covered

5.67 Until 2004 figures for the major power producers relate to periods of 52 weeks as listed below (although some data provided by electricity supply companies related to calendar months and were adjusted to the statistical calendar). In 2004 a change was made to a calendar year basis. This change was made in the middle of the year and the data are largely based on information collected monthly. The January to May 2004 data are therefore based on the 21 weeks ended 29 May 2004 and the calendar months June to December 2004, making a total of 361 days. In terms of days 2004 is therefore 1.1 per cent shorter than 2005:

Year	52 weeks ended
2003	28 December 2003
2004	21 weeks ended 29 May 2004 and 7 months ended 31 December 2004
2005	12 months ended 31 December 2005
2006	12 months ended 31 December 2006
2007	12 months ended 31 December 2007
2008	12 months ended 31 December 2008

5.68 Figures for industrial, commercial and transport undertakings relate to calendar years ending on 31 December, except for the iron and steel industry where figures relate to the following 52 or 53 week periods:

Year	53 weeks ended
2003	3 January 2004
	52 weeks ended
2004	1 January 2005
2005	31 December 2005
2006	30 December 2006
2007	29 December 2007
2008	27 December 2008

Monthly and quarterly data

5.69 Monthly and quarterly data on fuel use, electricity generation and supply and electricity availability and consumption are available on DECC's energy statistics web site www.decc.gov.uk/en/content/cms/statistics/source/source.aspx. Monthly data on fuel used in electricity generation by major power producers are given in Monthly Table 5.3 and monthly data on supplies by type of plant and type of fuel are given in Monthly Table 5.4. Monthly data on availability and consumption of electricity by the main sectors of the economy are given in Monthly Table 5.5. A quarterly commodity balance for electricity is published in DECC's quarterly statistical bulletin *Energy Trends* (Quarterly Table 5.2) along with a quarterly table of fuel use for generation by all generators and electricity supplied by major power producers (Quarterly Table 5.1). Both these quarterly tables are also available from DECC's energy statistics web site. See Annex C for more information about *Energy Trends*.

Data collection

5.70 For Major Power Producers, as defined in paragraphs 5.57 to 5.59, the data for the tables in this Digest are obtained from the results of an annual DECC inquiry, sent to each company, covering generating capacity, fuel use, generation, sales and distribution of electricity.

5.71 Another annual inquiry is sent to electricity distributors to establish electricity distributed by these companies. Similarly an annual inquiry is sent to licensed suppliers of electricity to establish electricity sales by these companies. Electricity consumption for the iron and steel sector is based on data provided by the Iron and Steel Statistics Bureau (ISSB) rather than electricity suppliers since electricity suppliers tend to over-estimate their sales to this sector by including some companies that use steel rather than manufacture it. The difference between the ISSB and electricity suppliers' figures has been re-allocated to other sectors based on the results of the latest Office for National Statistics' Purchases Inquiry. A further means of checking electricity consumption data is now being employed on data for 2006 and subsequent years. The data are validated using information on sectors from EU Emissions Trading Scheme (EU-ETS) sources. The figures could not be used directly in the allocation because not all electricity use is recorded by the EU-ETS as some companies are not signed up to the scheme. The EU-ETS was used to check minimum consumption by sectors against other data collected by DECC.

5.72 A sample of companies that generate electricity mainly for their own use (known as autogenerators or autoproducers – see paragraph 5.57, above) is covered by a quarterly inquiry commissioned by DECC but carried out by the Office for National Statistics (ONS). Where autogenerators operate a combined heat and power (CHP) plant, this survey is supplemented (on an annual basis) by information from the CHP Quality Assessment scheme (for autogenerators who have registered under the scheme – see Chapter 6 on CHP). There are two areas of autogeneration that are covered by direct data collection by DECC, mainly because the return contains additional energy information needed by the Department. These are the Iron and Steel industry, and generation on behalf of London Underground.

Losses and statistical differences

5.73 Statistical differences are included in Tables 5.1, 5.2 and 5.3. These arise because data collected on production and supply do not match exactly with data collected on sales or consumption. One of the reasons for this is that some of the data are based on different calendars as described in

paragraphs 5.67 and 5.68, above. Sales data based on calendar years will always have included more electricity consumption than the slightly shorter statistical year of exactly 52 weeks.

5.74 Of the losses shown in the commodity balance for electricity of just over 27,400 GWh in 2008, it is estimated that about 6,200 GWh (around 1.6 per cent of electricity available) were lost from the high voltage transmission system of the National Grid and 20,000 GWh (5.7 per cent) between the grid supply points (the gateways to the public supply system's distribution network) and customers' meters. The balance (0.3 per cent of electricity available) is accounted for by theft and meter fraud, accounting differences and calendar differences (as described in paragraph 5.73, above).

5.75 Care should be exercised in interpreting the figures for individual industries in the commodity balance tables. Where companies have moved between suppliers, it has not been possible to ensure consistent classification between and within industry sectors and across years. The breakdown of final consumption includes some estimated data. In 2008, for about 3 per cent of consumption of electricity supplied by the public distribution system, the sector figures are partially estimated.

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5.1 Commodity balances

Electricity

	GWh		
	2006	2007	2008
Total electricity			
Supply			
Production	393,440r	393,184r	385,560
Other sources (1)	3,853	3,859	4,089
Imports	10,282	8,613	12,294
Exports	-2,765	-3,398	-1,272
Marine bunkers	-	-	-
Stock change	-	-	-
Transfers	-	-	-
Total supply	404,809r	402,258r	400,671
Statistical difference (2)	+1,046r	+984r	+1,053
Total demand	403,763r	401,274r	399,619
Transformation	-	-	-
Electricity generation	-	-	-
Major power producers	-	-	-
Other generators	-	-	-
Heat generation	-	-	-
Petroleum refineries	-	-	-
Coke manufacture	-	-	-
Blast furnaces	-	-	-
Patent fuel manufacture	-	-	-
Other	-	-	-
Energy industry use	32,055r	33,441r	30,632
Electricity generation	18,504r	17,699r	16,317
Oil and gas extraction	546	560	598
Petroleum refineries	4,660r	6,696r	5,099
Coal extraction and coke manufacture	1,133	1,073	1,058
Blast furnaces	497	479	452
Patent fuel manufacture	-	-	-
Pumped storage	4,918	5,071	5,371
Other	1,798r	1,863r	1,736
Losses	27,410r	26,469r	27,425
Final consumption	344,298r	341,364r	341,561
Industry	117,918r	117,007r	113,558
Unclassified	-	-	-
Iron and steel	5,860	4,924	4,868
Non-ferrous metals	7,524r	7,331r	7,079
Mineral products	7,969r	7,859r	7,756
Chemicals	22,391r	22,200r	21,147
Mechanical engineering, etc	8,490r	8,518r	8,283
Electrical engineering, etc	7,341r	7,289r	6,979
Vehicles	5,848r	5,731r	5,595
Food, beverages, etc	12,317r	12,283r	12,224
Textiles, leather, etc	3,382	3,349	3,184
Paper, printing, etc	13,406r	13,356r	13,220
Other industries	21,749r	22,568r	21,717
Construction	1,640	1,599	1,505
Transport	8,232r	8,100r	8,434
Air	-	-	-
Rail (3)	2,900	2,900	2,900
Road	-	-	-
National navigation	-	-	-
Pipelines	-	-	-
Other	218,147r	216,257r	219,570
Domestic	116,449	115,051r	117,841
Public administration	22,192r	22,347r	22,108
Commercial	75,376	74,735r	75,554
Agriculture	4,130	4,125r	4,067
Miscellaneous	-	-	-
Non energy use	-	-	-

5.1 Commodity balances (continued)

Electricity

	GWh		
	2006	2007	2008
Electricity production			
Total production (4)	393,440r	393,184r	385,560
Primary electricity			
Major power producers	79,144	70,741r	62,067
Nuclear	75,451	63,028	52,486
Large scale hydro (4)	3,481	3,906	3,971
Small scale hydro	212	238	253
Wind (5)	-	3,569r	5,357
Other generators	5,136	2,664r	2,701
Nuclear	-	-	-
Large scale hydro	634	648	629
Small scale hydro	266	297	315
Wind (5)	4,236	1,719r	1,757
Secondary electricity			
Major power producers	278,236r	286,810r	289,128
Coal	145,311r	132,675r	121,251
Oil	3,359r	2,401r	3,667
Gas	126,637	149,346	161,579
Renewables	2,928r	2,388r	2,631
Other	-	-	-
Other generators	30,925r	32,970r	31,664
Coal	3,903r	3,870r	4,063
Oil	2,450r	2,331r	2,434
Gas	14,191r	16,438r	15,170
Renewables	7,010r	7,589r	7,704
Other	3,371r	2,742r	2,293
Primary and secondary production (6)			
Nuclear	75,451	63,028	52,486
Hydro	4,593	5,088	5,168
Wind	4,236	5,288r	7,114
Coal	149,214r	136,545	125,315
Oil	5,809r	4,732r	6,101
Gas	140,828r	165,784r	176,749
Other renewables	9,938r	9,977r	10,335
Other	3,371r	2,742r	2,293
Total production	393,440r	393,184r	385,560

(1) Pumped storage production.

(2) Total supply minus total demand.

(3) See paragraph 5.11.

(4) Excludes pumped storage production.

(5) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.3

(6) These figures are the same as the electricity generated figures in Table 5.6 except that they exclude pumped storage production. Table 5.6 shows that electricity used on works is deducted to obtain electricity supplied. It is electricity supplied that is used to produce Chart 5.3 showing each fuel's share of electricity output (see paragraph 5.28).

5.2 Electricity supply and consumption

	GWh				
	2004	2005	2006	2007	2008
Supply					
Production	391,280r	395,430r	393,440r	393,184r	385,560
Other sources (1)	2,649	2,873r	3,853	3,859	4,089
Imports	9,784	11,160	10,282	8,613	12,294
Exports	-2,294	-2,839	-2,765	-3,398	-1,272
Total supply	401,418r	406,624r	404,809r	402,258r	400,671
Statistical difference (2)	+2,447r	+2,427r	+1,046r	+984r	+1,053
Total demand	398,971r	404,197r	403,763r	401,274r	399,619
Transformation	-	-	-	-	-
Energy industry use	29,296r	30,049r	32,055r	33,441r	30,632
Electricity generation	17,032r	17,817r	18,504r	17,699r	16,317
Oil and gas extraction	558	505	546	560	598
Petroleum refineries	4,681	4,459	4,660r	6,696r	5,099
Coal and coke	1,118	1,165	1,133	1,073	1,058
Blast furnaces	468	515	497	479	452
Pumped storage	3,497	3,707	4,918	5,071	5,371
Other	1,942	1,881	1,798r	1,863r	1,736
Losses	30,728	27,674	27,410r	26,469r	27,425
Final consumption	338,948r	346,475	344,298r	341,364r	341,561
Industry	115,841r	120,524	117,918r	117,007r	113,558
Unclassified	-	-	-	-	-
Iron and steel	5,412	5,020	5,860	4,924	4,868
Non-ferrous metals	7,518	7,693	7,524r	7,331r	7,079
Mineral products	7,835	7,978	7,969r	7,859r	7,756
Chemicals	21,128	24,125	22,391r	22,200r	21,147
Mechanical engineering, etc	8,510	8,633	8,490r	8,518r	8,283
Electrical engineering, etc	6,809	7,420	7,341r	7,289r	6,979
Vehicles	5,682	5,841	5,848r	5,731r	5,595
Food, beverages, etc	12,348	12,773	12,317r	12,283r	12,224
Textiles, leather, etc	3,407	3,393	3,382	3,349	3,184
Paper, printing, etc	13,671	13,725	13,406r	13,356r	13,220
Other industries	21,716	21,995	21,749r	22,568r	21,717
Construction	1,804	1,929	1,640	1,599	1,505
Transport	8,463	8,816	8,232r	8,100r	8,434
Other	214,643r	217,135	218,147r	216,257r	219,570
Domestic	115,526	116,811	116,449	115,051r	117,841
Public administration	20,707r	20,878	22,192r	22,347r	22,108
Commercial	74,215	75,294	75,376	74,735r	75,554
Agriculture	4,194	4,152	4,130	4,125r	4,067
Miscellaneous	-	-	-	-	-
Non energy use	-	-	-	-	-

(1) Pumped storage production.

(2) Total supply minus total demand.

5.3 Commodity balances

Public distribution system and other generators

	2006			2007			2008		
	Public distribution system	Other generators	Total	Public distribution system	Other generators	Total	Public distribution system	Other generators	Total
Supply									
Major power producers (1)	357,379r	-	357,379r	357,551r	-	357,551r	351,195	-	351,195
Other generators	-	36,060r	36,060r	-	35,634r	35,634r	-	34,365	34,365
Other sources (2)	3,853	-	3,853	3,859	-	3,859	4,089	-	4,089
Imports	10,282	-	10,282	8,613	-	8,613	12,294	-	12,294
Exports	-2,765	-	-2,765	-3,398	-	-3,398	-1,272	-	-1,272
Transfers	+9,929r	-9,929r	-	9,008r	-9,008r	-	10,130	-10,130	-
Total supply	378,678r	26,132r	404,809r	375,633r	26,625r	402,258r	376,436	24,235	400,671
Statistical difference (3)	+1,046r	+0r	+1,046r	+979r	+5r	+984r	+1,053	-0	+1,053
Total demand	377,632r	26,132r	403,763r	374,654r	26,621r	401,274r	375,384	24,235	399,619
Transformation									
Energy industry use	26,647r	5,409r	32,055r	25,937r	7,504r	33,441r	24,788	5,844	30,632
Electricity generation	17,031r	1,472r	18,504r	16,099r	1,600r	17,699r	14,671	1,646	16,317
Oil and gas extraction	546	-	546	560	-	560	598	-	598
Petroleum refineries	1,501	3,159r	4,660r	1,461	5,235r	6,696r	1,482	3,617	5,099
Coal and coke	1,037	96	1,133	983	90	1,073	979	79	1,058
Blast furnaces	-	497	497	-	479	479	-	452	452
Pumped storage	4,918	-	4,918	5,071	-	5,071	5,371	-	5,371
Other fuel industries	1,614	185r	1,798r	1,763	101r	1,863r	1,687	49	1,736
Losses	27,384r	27	27,410r	26,443r	26	26,469r	27,403	23	27,425
Final consumption	323,602	20,696r	344,298r	322,274r	19,091r	341,364r	323,193	18,368	341,561
Industry	100,731	17,187r	117,918r	100,988r	16,019r	117,007r	98,196	15,361	113,558
Iron and steel	4,871	989	5,860	3,983	941	4,924	3,983	885	4,868
Non-ferrous metals	4,429	3,095r	7,524r	4,133r	3,198r	7,331r	4,016	3,063	7,079
Mineral products	7,795	174r	7,969r	7,852r	7r	7,859r	7,669	87	7,756
Chemicals	15,102	7,289r	22,391r	15,312r	6,888r	22,200r	15,738	5,409	21,147
Mechanical engineering, etc	8,401	90	8,490r	8,197r	321r	8,518r	7,922	362	8,283
Electrical engineering, etc	7,322	20r	7,341r	7,268	21r	7,289r	6,958	21	6,979
Vehicles	5,775	73r	5,848r	5,672r	59r	5,731r	5,535	59	5,595
Food, beverages, etc	10,821	1,497r	12,317r	12,018r	266r	12,283r	10,712	1,512	12,224
Textiles, leather, etc	3,377	5	3,382	3,344	5	3,349	3,179	5	3,184
Paper, printing, etc	10,161	3,245r	13,406r	9,475r	3,881r	13,356r	9,770	3,450	13,220
Other industries	21,052	697r	21,749r	22,151	417r	22,568r	21,225	493	21,717
Construction	1,625	15	1,640	1,584	15	1,599	1,490	15	1,505
Transport	7,520	712r	8,232r	7,515	586r	8,100r	7,975	459	8,434
Of which National Rail (4)	2,900	-	2,900	2,900	-	2,900	2,900	-	2,900
Other	215,350	2,797r	218,147r	213,770r	2,486r	216,257r	217,022	2,548	219,570
Domestic	116,449	-	116,449	115,051r	-	115,051r	117,841	-	117,841
Standard	65,668	-	65,668	65,708r	-	65,708r	67,410	-	67,410
Economy 7 and other off-peak	31,321	-	31,321	30,325r	-	30,325r	30,422	-	30,422
Prepayment (standard)	12,934	-	12,934	12,921	-	12,921	13,702	-	13,702
Prepayment (off-peak)	6,098	-	6,098	5,791	-	5,791	6,008	-	6,008
Sales under any other arrangement	428	-	428	306	-	306	300	-	300
Public administration	19,395	2,797r	22,192r	19,860r	2,486r	22,347r	19,560	2,548	22,108
Public lighting (5)	2,147	-	2,147	2,223	-	2,223	2,179	-	2,179
Other public sector	17,248	2,797r	20,045r	17,637r	2,486r	20,124r	17,381	2,548	19,929
Commercial	75,376	-	75,376	74,735r	-	74,735r	75,554	-	75,554
Shops	34,348	-	34,348	31,174r	-	31,174r	31,286	-	31,286
Offices	22,811	-	22,811	25,057r	-	25,057r	25,732	-	25,732
Hotels	8,360	-	8,360	8,421r	-	8,421r	8,275	-	8,275
Combined domestic/commercial premises	2,078	-	2,078	2,196	-	2,196	2,265	-	2,265
Post and telecommunications	5,979	-	5,979	6,086	-	6,086	6,184	-	6,184
Unclassified	1,800	-	1,800	1,800	-	1,800	1,812	-	1,812
Agriculture	4,130	-	4,130	4,125r	-	4,125r	4,067	-	4,067

(1) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.3

(2) Pumped storage production.

(3) Total supply minus total demand.

(4) See paragraph 5.11.

5.4 Fuel used in generation⁽¹⁾

	Unit	2004	2005	2006	2007	2008
Original units of measurement						
Major power producers (2)						
Coal	M tonnes	48.97	50.58	55.93r	51.03r	46.28
Oil (3)	"	0.55	0.79	0.81	0.54	0.84
Gas	GWh	304,497	295,643	278,149r	319,848r	341,057
Other generators (2)						
Transport undertakings:						
Gas	GWh	27	38	24	21	21
Undertakings in industrial and commercial sectors:						
Coal	M tonnes	1.49	1.48	1.51r	1.48r	1.52
Oil (4)	"	0.48	0.42	0.47r	0.44r	0.41
Gas	GWh	35,706	32,691	30,081r	32,878r	33,011
Major power producers (2)						
Coal		30.375	31.654	34.998	31.934	28.944
Oil (4)		0.577	0.883	1.010	0.750	1.160
Gas		26.182	25.421	23.917r	27.501	29.594
Nuclear		18.164	18.372	17.131	14.036	11.910
Hydro (natural flow) (5)		0.337	0.329	0.318	0.356	0.368
Wind (5) (6)		-	-	-	0.307r	0.461
Other renewables (5)		0.540	0.818	0.731	0.625	0.750
Net imports		0.644	0.715	0.646	0.448	0.948
Total major power producers (2)		76.819	78.191r	78.751r	75.958r	74.134
Of which: conventional thermal and other stations (7)						
		33.667	35.823r	39.823r	36.528r	34.635
combined cycle gas turbine stations						
		24.007	22.952	20.833	24.589	26.274
Other generators (2)						
Transport undertakings:						
Gas		0.002	0.003	0.002	0.002	0.002
Undertakings in industrial and commercial sectors:						
Coal		0.937	0.921	0.945r	0.930r	0.951
Oil (4)		0.523	0.469	0.528r	0.509r	0.606
Gas		3.070	2.811	2.587r	2.827r	2.838
Hydro (natural flow) (5)		0.080	0.094	0.077	0.081	0.081
Wind (5) (6)		0.166	0.250	0.363	0.147r	0.150
Other renewables (5)		2.228	2.535	2.739r	2.855r	2.783
Other fuels (8)		1.387	1.834	1.497r	1.215r	0.976
Total other generators (2)		8.394	8.917	8.739r	8.567r	8.386
All generating companies						
Coal		31.312	32.575	35.943r	32.865r	29.895
Oil (3)(4)		1.100	1.352	1.539r	1.259r	1.766
Gas		29.254	28.235	26.505r	30.330r	32.435
Nuclear		18.164	18.372	17.131	14.036	11.910
Hydro (natural flow) (5)		0.418	0.423	0.395	0.438r	0.449
Wind (5)		0.166	0.250	0.363	0.453	0.610
Other renewables (5)		2.767r	3.353	3.471r	3.481r	3.533
Other fuels (8)		1.387	1.834	1.497r	1.215r	0.976
Net imports		0.644	0.715	0.646	0.448	0.948
Total all generating companies		85.214	87.108	87.491r	84.525r	82.520

(1) For details of where to find monthly updates of fuel used in electricity generation by major power producers and quarterly updates of fuel used in electricity generation by all generating companies see paragraph 5.69.

(2) See paragraphs 5.57 to 5.59 for information on companies covered.

(3) Includes oil used in gas turbine and diesel plants, and oil used for lighting up coal fired boilers. Other fossil fuels such as petcoke are included with oil where the figures shown in million tonnes of oil equivalent.

(4) Includes refinery gas.

(5) Renewable sources, which are included under hydro and other renewables in this table, are shown separately in Table 7.4 of Chapter 7.

(6) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.3

(7) Includes gas turbines, oil engines and plants producing electricity from renewable sources other than hydro.

(8) Main fuels included are coke oven gas, blast furnace gas, colliery methane and waste products from chemical processes.

5.5 Electricity supply, electricity supplied (net), electricity available, electricity consumption and electricity sales

	GWh				
	2004	2005	2006	2007	2008
Total supply					
(as given in Tables 5.1 and 5.2)	401,418r	406,624r	404,809r	402,258r	400,671
less imports of electricity	-9,784	-11,160	-10,282	-8,613	-12,294
plus exports of electricity	+2,294	+2,839	+2,765	+3,398	+1,272
less electricity used in pumped storage	-3,497	-3,707	-4,918	-5,071	-5,371
less electricity used on works	-17,032r	-17,817r	-18,504r	-17,699r	-16,317
equals					
Electricity supplied (net)	373,399r	376,779r	373,870r	374,273r	367,961
(as given in Tables 5.6, 5.1.2 and 5.1.3)					
Total supply					
(as given in Tables 5.1 and 5.2)	401,418r	406,624r	404,809r	402,258r	400,671
less electricity used in pumped storage	-3,497	-3,707	-4,918	-5,071	-5,371
less electricity used on works	-17,032r	-17,817r	-18,504r	-17,699r	-16,317
equals					
Electricity available	380,889r	385,100r	381,387r	379,488r	378,983
(as given in Table 5.1.2)					
Final consumption					
(as given in Tables 5.2 and 5.3)	338,948r	346,475	344,298r	341,364r	341,561
plus Iron and steel consumption counted as energy industry use	+625	+675	+637	+607	+566
equals					
Final users	339,573r	347,150	344,935r	341,971r	342,127
(as given in Table 5.1.2)					
Final consumption					
Public distribution system					
(as given in Table 5.3)	319,066	324,230	323,602	322,274r	323,193
plus Oil and gas extraction use	+558	+505	+546	+560	+598
plus Petroleum refineries use	+1,478	+1,593	+1,501	+1,461	+1,482
plus Coal and coke use	+1,027	+1,066	+1,037	+983	+979
plus Other fuel industries use	+1,585	+1,679	+1,614	+1,763	+1,687
equals					
UK Electricity sales (1)	323,714	329,073	328,300	327,041r	327,939

(1) The renewables obligation percentage is calculated using total renewables generation on an obligation basis from Table 7.5 (x 100) as the numerator, and this figure as the denominator. Separate electricity sales data for public electricity suppliers are given for England and Wales, Scotland and Northern Ireland in Table 5.5 of Energy Trends on the DECC web site at www.decc.gov.uk/en/content/cms/statistics/source/electricity/electricity.aspx (and scroll to the Monthly Tables section).

5.6 Electricity fuel use, generation and supply

GWh

	Thermal sources						Non-thermal sources				All sources
	Coal	Oil	Gas	Nuclear	Renewables (1)	Other (3)	Total	Hydro-natural flow	Hydro-pumped storage	Other (4)	
2004											
Major power producers (2)											
Fuel used	353,256	6,709	304,495	211,248	6,282	-	881,989	3,908	2,649	-	888,546
Generation	127,827	1,883	140,577	79,999	1,471	-	351,757	3,908	2,649	-	358,313
Used on works	5,890	354	2,819	6,317	104	-	15,486	6	90	-	15,582
Supplied (gross)	121,937	1,528	137,758	73,682	1,367	-	336,271	3,901	2,559	-	342,732
Used in pumping											3,497
Supplied (net)											339,235
Other generators (2)											
Fuel used	10,902	6,083	35,733	-	25,902	16,132	94,751	936	-	1,939	97,627
Generation	3,961	2,761	16,487	-	6,469	3,062	32,740	936	-	1,939	35,616
Used on works	208	196	511	-	408	111	1,434	17	-	-	1,451
Supplied	3,753	2,565	15,976	-	6,060	2,951	31,306	919	-	1,939	34,165
All generating companies											
Fuel used	364,158	12,792	340,228	211,248	32,184	16,132	976,741	4,844	2,649	1,939	986,172
Generation	131,788	4,644	157,064	79,999	7,940	3,062	384,497	4,844	2,649	1,939	393,929
Used on works	6,098	550	3,330	6,317	512	111	16,920	23	90	-	17,032
Supplied (gross)	125,689	4,094	153,734	73,682	7,428	2,951	367,577	4,821	2,559	1,939	376,896
Used in pumping											3,497
Supplied (net)											373,399
2005											
Major power producers (2)											
Fuel used	368,134	10,268	295,643	213,661	9,515	-	897,222	3,826	2,873r	-	903,921r
Generation	130,690r	2,921r	137,483	81,618	2,744r	-	355,456	3,826	2,873r	-	362,156r
Used on works	5,914r	530r	2,959	6,445	258r	-	16,106	5	97r	-	16,209r
Supplied (gross)	124,776r	2,391r	134,524	75,173	2,486r	-	339,350	3,821	2,776	-	345,947
Used in pumping											3,707
Supplied (net)											342,240
Other generators (2)											
Fuel used	10,712	5,454	32,729	-	29,475	21,327	99,696	1,096	-	2,912	103,704
Generation	3,947	2,417	15,159	-	6,941r	3,676	32,140r	1,096	-	2,912	36,148r
Used on works	210	157	470	-	472r	133	1,442r	166	-	-	1,608r
Supplied	3,737	2,260	14,689	-	6,468r	3,543	30,698r	930	-	2,912	34,539r
All generating companies											
Fuel used	378,846	15,722	328,372	213,661	38,990	21,327	996,918	4,922	2,873r	2,912	1,007,625r
Generation	134,637r	5,338r	152,642	81,618	9,685r	3,676	387,596r	4,922	2,873r	2,912	398,303r
Used on works	6,124r	688r	3,428	6,445	731r	133	17,548r	171	97r	-	17,817r
Supplied (gross)	128,513r	4,650r	149,214	75,173	8,955r	3,543	370,048r	4,750	2,776	2,912	380,486r
Used in pumping											3,707
Supplied (net)											376,780r
2006											
Major power producers (2)											
Fuel used	407,027	11,751	278,149	199,237	8,504	-	904,668	3,693	3,853	-	912,214
Generation	145,311r	3,359r	126,637	75,451	2,928r	-	353,686r	3,693	3,853	-	361,232r
Used on works	7,164r	592r	2,634	6,214	285r	-	16,888r	13	130	-	17,031r
Supplied (gross)	138,147r	2,767r	124,003	69,237	2,643r	-	336,798r	3,680	3,722	-	344,201r
Used in pumping											4,918
Supplied (net)											339,283r
Other generators (2)											
Fuel used	10,991r	6,146r	30,105r	-	31,849r	17,412r	96,503r	900r	-	4,236	101,639r
Generation	3,903r	2,450r	14,191r	-	7,010r	3,371r	30,925r	900r	-	4,236	36,060r
Used on works	210r	156r	440r	-	534r	119r	1,458r	14	-	-	1,472r
Supplied	3,693r	2,295r	13,751r	-	6,476r	3,252r	29,467r	885	-	4,236	34,588r
All generating companies											
Fuel used	418,018r	17,897r	308,254r	199,237	40,352r	17,412r	1,001,171r	4,593	3,853	4,236	1,013,852r
Generation	149,214r	5,809r	140,828r	75,451	9,938r	3,371r	384,611r	4,593	3,853	4,236	397,292r
Used on works	7,373r	748r	3,074r	6,214	819r	119r	18,346r	27	130	-	18,504r
Supplied (gross)	141,840r	5,061r	137,754r	69,237	9,119r	3,252r	366,265r	4,566r	3,722	4,236	378,789r
Used in pumping											4,918
Supplied (net)											373,871r

5.6 Electricity fuel use, generation and supply (continued)

	GWh										
	Thermal sources						Non-thermal sources				
	Coal	Oil	Gas	Nuclear	Renewables (1)	Other (3)	Total	Hydro-natural flow	Hydro-pumped storage	Other (4)	Total All sources
2007											
Major power producers (2) (5)											
Fuel used	371,396	8,718	319,836	163,244r	7,271	-	870,467r	4,144	3,859	3,569r	882,038r
Generation	132,675r	2,401r	149,346	63,028	2,388r	-	349,838r	4,144	3,859	3,569r	361,410r
Used on works	6,737r	405r	2,894	5,779	240r	-	16,055r	30	13	-	16,099r
Supplied (gross)	125,938r	1,996r	146,452	57,249	2,148r	-	333,783	4,114	3,846	3,569r	345,311r
Used in pumping											5,071
Supplied (net)											340,240r
Other generators (2) (5)											
Fuel used	10,820r	5,921r	32,898r	-	33,194r	14,135r	96,969r	946	-	1,719r	99,634r
Generation	3,870r	2,331r	16,438r	-	7,589r	2,742r	32,970r	946	-	1,719r	35,634r
Used on works	207r	160r	509r	-	615r	92r	1,584r	16	-	-	1,600r
Supplied	3,662r	2,171r	15,928r	-	6,974r	2,650r	31,386r	930	-	1,719r	34,034r
All generating companies											
Fuel used	382,217r	14,639r	352,735r	163,244r	40,466r	14,135r	967,436r	5,089	3,859	5,288r	981,672r
Generation	136,545	4,732r	165,784r	63,028	9,977r	2,742r	382,808r	5,089	3,859	5,288r	397,044r
Used on works	6,945r	565r	3,403r	5,779	855r	92r	17,639r	46	13	-	17,699r
Supplied (gross)	129,600r	4,167r	162,380r	57,249	9,122r	2,650r	365,169r	5,043	3,846	5,288r	379,346r
Used in pumping											5,071
Supplied (net)											374,274r
2008											
Major power producers (2) (5)											
Fuel used	336,621	13,486	344,184	138,508	8,722	-	841,520	4,224	4,089	5,357	855,190
Generation	121,251	3,667	161,579	52,486	2,631	-	341,614	4,224	4,089	5,357	355,284
Used on works	6,159	629	2,777	4,813	264	-	14,642	15	14	-	14,671
Supplied (gross)	115,093	3,038	158,802	47,673	2,367	-	326,972	4,209	4,075	5,357	340,613
Used in pumping											5,371
Supplied (net)											335,242
Other generators (2) (5)											
Fuel used	11,055	7,051	33,032	-	32,345	11,348	94,831	944	-	1,757	97,532
Generation	4,063	2,434	15,170	-	7,704	2,293	31,664	944	-	1,757	34,365
Used on works	215	168	470	-	702	75	1,629	17	-	-	1,646
Supplied	3,848	2,266	14,700	-	7,002	2,218	30,035	927	-	1,757	32,719
All generating companies											
Fuel used	347,676	20,536	377,216	138,508	41,066	11,348	933,782	5,168	4,089	7,114	952,722
Generation	125,315	6,101	176,749	52,486	10,335	2,293	373,278	5,168	4,089	7,114	389,649
Used on works	6,374	797	3,247	4,813	966	75	16,271	32	14	-	16,317
Supplied (gross)	118,941	5,304	173,502	47,673	9,369	2,218	357,007	5,136	4,075	7,114	373,332
Used in pumping											5,371
Supplied (net)											367,961

	2004		2005		2006		2007		2008	
	Conv- ventional thermal	CCGT								
	(6)		(6)		(6)		(6)		(6)	
Major power producers (2)										
Generated	140,576	131,182	143,149	130,689	159,741r	118,495	146,984r	139,826	130,394	158,734
Supplied (gross)	133,607	128,983	135,999	128,179	151,163r	116,398	138,973	137,561	123,074	156,225
Other generators										
Generated	20,888r	11,852	20,348	11,792	19,364r	11,561	21,454r	11,516	20,655	11,009
Supplied (gross)	20,046r	11,260	19,494	11,204	18,483r	10,984	20,445r	10,941	19,575	10,460
All generating companies										
Generated	161,464r	143,034	163,497	142,481	179,104r	130,056	168,438r	151,342	151,049	169,743
Supplied (gross)	153,653r	140,243	155,492	139,383	169,646r	127,382	159,418r	148,502	142,649	166,685

(1) Thermal renewable sources are those included under biofuels and non-biodegradable wastes in Chapter 7.

(2) See paragraphs 5.57 to 5.59 on companies covered.

(3) Other thermal sources include coke oven gas, blast furnace gas and waste products from chemical processes.

(4) Other non-thermal sources include wind, wave and solar photovoltaics.

(5) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.3

(6) Includes gas turbines, oil engines and plants producing electricity from thermal renewable sources; also stations with some CCGT capacity but mainly operate in conventional thermal mode.

5.7 Plant capacity - United Kingdom

MW

end December

	2004	2005	2006	2007	2008
Major power producers (1)					
Total transmission entry capacity (2)	73,293	73,941	74,996	76,052r	76,450
Of which:					
Conventional steam stations:	31,982	32,292	33,608	33,734r	32,426
Coal fired	22,639	22,627	22,882	23,008	23,137
Oil fired	2,930	3,262	3,778	3,778	3,833
Mixed or dual fired (3)	6,413	6,403	6,948	6,948r	5,456
Combined cycle gas turbine stations	23,783	24,263	24,859	24,854	26,494
Nuclear stations	11,852	11,852	10,969	10,979	10,979
Gas turbines and oil engines	1,495	1,356	1,444	1,445r	1,258
Hydro-electric stations:					
Natural flow	1,276	1,273	1,294	1,293	1,412
Pumped storage	2,788	2,788	2,726	2,744	2,744
Wind (4)				795r	958
Renewables other than hydro and wind	117	117	96	207r	178
Other generators (1)					
Total capacity of own generating plant (6)	6,829	7,422	7,389r	6,912r	7,092
Of which:					
Conventional steam stations (5)	3,275	3,269	3,059r	3,033r	2,975
Combined cycle gas turbine stations	1,968	2,182	2,106r	2,076r	2,069
Hydro-electric stations (natural flow)	132	120	123	127	127
Wind (4)	393	658	822	247r	474
Renewables other than hydro and wind	1,061	1,194	1,279r	1,428r	1,447
All generating companies					
Total capacity	80,122	81,363	82,385r	82,964r	83,542
Of which:					
Conventional steam stations (5)	35,257	35,561	36,667r	36,767r	35,401
Combined cycle gas turbine stations	25,751	26,445	26,965r	26,930r	28,563
Nuclear stations	11,852	11,852	10,969	10,979	10,979
Gas turbines and oil engines	1,495	1,356	1,444	1,445r	1,258
Hydro-electric stations:					
Natural flow	1,408	1,393	1,417	1,420	1,539
Pumped storage	2,788	2,788	2,726	2,744	2,744
Wind (4)	393	658	822	1,042	1,432
Renewables other than hydro and wind	1,178	1,311	1,375r	1,635r	1,625

(1) See paragraphs 5.57 to 5.59 for information on companies covered.

(2) See paragraph 5.63 for definition. Data before 2006 are based on declared net capability.

(3) Includes gas fired stations that are not Combined Cycle Gas Turbines, or have some CCGT capability but mainly operate as conventional thermal stations.

(4) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.3

(5) For other generators, conventional steam stations include combined heat and power plants (electrical capacity only) but exclude combined cycle gas turbine plants, hydro-electric stations and plants using renewable sources.

(6) "Other generators" capacities are given in declared net capacity terms, see paragraph 5.64

5.8 Plant capacity - England and Wales, Scotland, and Northern Ireland

	MW				
	end December				
	2004	2005	2006	2007	2008
Major power producers in England and Wales (1)					
Total transmission entry capacity (2)	61,875	62,343	63,390	63,876r	63,751
Of which:					
Conventional steam stations:	26,286	26,792	28,132	28,258r	28,450
Coal fired	19,183	19,171	19,426	19,552	19,681
Oil fired	2,750	3,262	3,778	3,778	3,833
Mixed or dual fired (3)	4,353	4,359	4,928	4,928r	4,936
Combined cycle gas turbine stations	22,664	22,765	23,358	23,353	23,267
Nuclear stations	9,412	9,412	8,559	8,569	8,569
Gas turbines and oil engines	1,177	1,038	1,124	1,018r	820
Hydro-electric stations:					
Natural flow	131	131	136	136r	126
Pumped storage	2,088	2,088	1,986	2,004	2,004
Wind (4)				375r	381
Renewables other than hydro and wind	117	117	96	163r	134
Major power producers in Scotland (1)					
Total transmission entry capacity (2)	9,555	9,537	9,582	10,127r	10,414
Of which:					
Conventional steam and combined cycle gas turbine stations	5,119	5,103	5,119	5,119	5,119
Nuclear stations	2,440	2,440	2,410	2,410	2,410
Gas turbines and oil engines	152	152	155	263r	264
Hydro-electric stations:					
Natural flow	1,144	1,142	1,158	1,157r	1,286
Pumped storage	700	700	740	740	740
Wind (4)				395r	552
Renewables other than hydro and wind	-	-	-	44	44
Major power producers in Northern Ireland (1)					
Total transmission entry capacity (2)	1,862	2,061	2,023	2,048r	2,284

(1) See paragraphs 5.57 to 5.59 for information on companies covered.

(2) See paragraph 5.63 for definition. Data before 2006 are based on declared net capability.

(3) Includes gas fired stations that are not Combined Cycle Gas Turbines.

(4) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.3

5.9 Capacity of other generators

	MW				
	end December				
	2004	2005	2006	2007	2008
Capacity of own generating plant (1) (2)					
Undertakings in industrial and commercial sector:					
Oil and gas terminals and oil refineries	868	986r	983r	1,015r	1,013
Iron and steel	313	314r	315r	316r	316
Chemicals	1,176	1,269r	1,123r	1,084r	1,102
Engineering and other metal trades	620	631r	622r	619r	633
Food, drink and tobacco	375	411	410r	426r	406
Paper, printing and publishing	788	779	757r	763r	781
Other (3)	2,586	2,929r	3,075r	2,587r	2,738
Total industrial and commercial sector	6,726	7,319	7,286r	6,809r	6,989
Undertakings in transport sector	103	103	103	103	103
Total other generators	6,829	7,422	7,389r	6,912r	7,092

(1) For combined heat and power plants the electrical capacity only is included. Further CHP capacity is included under major power producers in Table 5.7. A detailed analysis of CHP capacity is given in the tables of Chapter 6.

It has not been possible to include revisions to CHP capacity for years before 2005 in this table, see paragraph 5.40.

(2) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.3

(3) Includes companies in the commercial sector.

5.10 Plant loads, demand and efficiency

Major power producers ⁽¹⁾

	Unit	2004	2005	2006	2007	2008
Simultaneous maximum load met ⁽²⁾⁽³⁾	MW	61,013	61,697	59,071	61,527	60,289
<i>of which</i> England and Wales	MW	53,795	..	..	..	..
Scotland	MW	5,579	..	..	..	..
Great Britain	MW	59,374	60,100	57,490	59,880	58,590
Northern Ireland	MW	1,639	1,597	1,581	1,647	1,699
Maximum demand as a percentage of UK capacity	Per cent	83.3	83.4	78.8r	80.9r	78.9
Plant load factor						
Combined cycle gas turbine stations	Per cent	65.0	60.9	54.1	63.2	69.3
Nuclear stations	"	71.8	72.4	69.3	59.6	49.4
Hydro-electric stations:						
Natural flow	"	35.3	34.2	32.7	36.3	35.4
Pumped storage	"	10.6	11.4	15.4	16.1	16.9
Conventional thermal and other stations ⁽⁴⁾	"	46.0	46.1	50.1r	45.0	40.5
of which coal-fired stations	"	62.3	63.0	69.3r	62.7r	56.7
All plant	"	54.7	53.6	52.8	52.2r	50.9
System load factor	"	67.2	66.2r	68.7r	65.5r	67.0
Thermal efficiency						
(gross calorific value basis)						
Combined cycle gas turbine stations	"	47.0	49.0	48.9r	48.9	51.9
Coal fired stations	"	36.2	35.6	35.7r	35.7r	36.0
Nuclear stations	"	37.9	38.2	37.9	38.6	37.9

(1) See paragraphs 5.57 to 5.59 for information on companies covered.

(2) Data cover the 12 months ending March of the following year, e.g. 2008 data are for the year ending March 2009.

(3) Prior to 2005 the demands shown are those that occurred in Scotland and Northern Ireland at the same time as England and Wales had their maximum demand. In 2005, 2006 and 2007 the Northern Ireland demand shown is that which occurred at the time as in Great Britain. See paragraph 5.65 for further details.

(4) Conventional steam plants, gas turbines and oil engines and plants producing electricity from renewable sources other than hydro.

5.11 Power Stations in the United Kingdom (operational at the end of May 2009)⁽¹⁾

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
AES	Kilroot	coal/oil	600	1981	Northern Ireland
Ardrossan Windfarm (2)	Ardrossan	wind	24	2004	Scotland
Ardrossan Windfarm (2)	Ardrossan Extension	wind	6	2008	Scotland
Baglan Generation Ltd	Baglan Bay	gas turbine	575	2002	Wales
Barking Power	Barking	CCGT	1,000	1994	London
Beaufort Wind Ltd (3)	Bears Down	wind	10	2001	South West
	Bein Ghlas	wind	8	1999	Scotland
	Bryn Titli	wind	10	1994	Wales
	Carno	wind	34	1996	Wales
	Causeymire	wind	48	2004	Scotland
	Kirkby Moor	wind	5	1993	North West
	Lambrigg	wind	7	2000	North West
	Llyn Alaw	wind	20	1997	Wales
	Mynydd Gorddu	wind	10	1996	Wales
	Novar	wind	17	1997	Scotland
	Taff Ely	wind	9	1993	Wales
	Tow Law	wind	2	2001	North East
	Trysglwyn	wind	6	1996	Wales
	Windy Standard	wind	22	1996	Scotland
	North Hoyle	wind (offshore)	60	2003	Wales
	Farr	wind	92	2006	Scotland
Ffynnon Oer	wind	32	2006	Wales	
Bicker Fen Windfarm Ltd	Bicker Fen	wind	26	2008	East Midlands
Braes of Doune Windfarm (2)	Braes of Doune	wind	72	2006	Scotland
British Energy	Dungeness B	nuclear	1,040	1983	South East
	Hartlepool	nuclear	1,190	1984	North East
	Heysham 1	nuclear	1,160	1984	North West
	Heysham 2	nuclear	1,240	1988	North West
	Hinkley Point B	nuclear	840	1976	South West
	Sizewell B	nuclear	1,188	1995	East
	Hunterston B	nuclear	860	1976	Scotland
	Torness	nuclear	1,205	1988	Scotland
	Eggborough	coal	1,960	1967	Yorkshire and the Humber
	Aberdare District Energy	gas	10	2002	Wales
Bridgewater District Energy	gas	10	2000	South West	
Sevington District Energy	gas	10	2000	South East	
Solutia District Energy	gas	10	2000	Wales	
Cemmaes Windfarm Ltd (5)	Cemmaes	wind	15	2002 (6)	Wales
Centrica	Barry	CCGT	230	1998	Wales
	Glanford Brigg	CCGT	260	1993	Yorkshire and the Humber
	Killingholme	CCGT	665	1994	the Humber
	Kings Lynn	CCGT	340	1996	East
	Peterborough	CCGT	405	1993	East
	Roosecote	CCGT	229	1991	North West
	South Humber Bank	CCGT	1,285	1996	Yorkshire and the Humber
	Glens of Foudland	wind	26	2005	Scotland
	Barrow Offshore Windfarm	wind (offshore)	90	2006	North West

For footnotes see page 152

5.11 Power Stations in the United Kingdom (operational at the end of May 2009)⁽¹⁾ (continued)

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
Citigen (London) UK Ltd	Charterhouse St, London	gas/gas oil CHP	16	1995	London
Cold Northcott Windfarm Ltd(5)	Cold Northcott	wind	7	1993	South West
Coolkeeragh ESB Ltd	Coolkeeragh	CCGT	408	2005	Northern Ireland
Corby Power Ltd	Corby	CCGT	401	1993	East Midlands
Coryton Energy Company Ltd	Coryton	CCGT	732	2001	East
Derwent Cogeneration	Derwent	gas CHP	214	1994	East Midlands
Drax Power Ltd	Drax	coal	3,870	1974	Yorkshire and the Humber
	Drax GT	gas oil	75	1971	
EDF Energy	Sutton Bridge	CCGT	803	1999	East
	Cottam	coal	2,008	1969	East Midlands
	West Burton	coal	2,012	1967	East Midlands
	West Burton GT	gas oil	40	1967	East Midlands
	Thames Valley Power	Gas/Gas oil CHF	15	1995	London
	London Heat & Power Company (Imperial College)	gas CHP	9	2000	London
	Barkantine Heat & Power Company	Gas CHP	1.4	2000	London
	Kirkheaton	wind	1.8	2000	North East
	High Hedley	wind	2.4	2001	North East
	High Hedley II	wind	5	2008	North East
	Langley	wind	8	2008	South East
	Trimdon	wind	5	2008	North East
	Broom Hill	wind	8	2008	North East
EDF Energy Renewables	Bicker Fen	wind	26	2008	East
	Walkaway	wind	14	2008	North East
EPR Ely Limited	Elean	straw/gas	38	2001	East
EPR Glanford Ltd	Glanford	meat & bone meal	13	1993	East
EPR Eye Ltd	Eye, Suffolk	AWDF (7)	13	1992	East
EPR Thetford Ltd	Thetford	poultry litter	39	1998	East
EPR Scotland Ltd	Westfield	poultry litter	12	2000	Scotland
E.On UK	Kingsnorth	coal/oil	1,940	1970	South East
	Ironbridge	coal	970	1970	West Midlands
	Ratcliffe	coal	2,000	1968	East Midlands
	Grain	oil	1,300	1979	South East
	Grain GT	gas oil	55	1978	South East
	Kingsnorth GT	gas oil	34	1967	South East
	Ratcliffe GT	gas oil	34	1966	East Midlands
	Taylor's Lane GT	gas oil	132	1979	London
	Connahs Quay	CCGT	1,380	1996	Wales
	Cottam Development Centre	CCGT	400	1999	East Midlands
	Enfield	CCGT	392	1999	London
	Killingholme	CCGT	900	1993	Yorkshire and the Humber
	Sandbach	CCGT	56	1999	North West
	Castleford	CCGT	56	2002	Yorkshire and the Humber
	Thornhill	CCGT	50	1998	Yorkshire and the Humber
	Steven's Croft	biomass	44	2007	Scotland

For footnotes see page 152

5.11 Power Stations in the United Kingdom (operational at the end of May 2009)⁽¹⁾ (continued)

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
	Rheidol	hydro	49	1961	Wales
	Askam	wind	5	1999	North West
	Bessy Bell	wind	5	1995	Northern Ireland
	Blood Hill	wind	2	1992	East
	Bowbeat	wind	31	2002	Scotland
	Deucheran Hill	wind	16	2001	Scotland
	Hare Hill	wind	5	2004	North East
	High Volts	wind	8	2004	North East
	Holmside	wind	5	2004	North East
	Lowca	wind	5	2000	North West
	Oldside	wind	5	1996	North West
	Out Newton	wind	9	2002	Yorkshire and the Humber
	Rheidol	wind	2	1997	Wales
	Scroby Sands	wind (offshore)	60	2005	East
	Siddick	wind	4	1996	North West
	St Breock	wind	5	1994	South West
	Stags Holt	wind	18	2007	East
	Rhyd-y-Groes	wind	7	1992	Wales
	Blyth Offshore	wind (offshore)	4	2000	North East
Fenland Windfarms Ltd (5)	Deeping	wind	16	2006	East Midlands
	Glass Moor	wind	16	2006	East Midlands
	Red House	wind	12	2006	East Midlands
	Red Tile	wind	24	2007	East Midlands
Fred Olsen	Crystal Rig Windfarm	wind	50	2003	Scotland
	Paul's Hill	wind	64	2005	Scotland
	Rothes	wind	51	2004	Scotland
Gaz de France	Shotton	gas CHP	180	2001	Wales
GDF Suez Teesside Limited	Teesside Power Station	CCGT	1875	1992	North East
Great Orton Windfarm Ltd (5)	Great Orton	wind	4	1999 (6)	North West
HG Capital	Tyr Mostyn & Foel Goch	wind	21	2005	Wales
High Hedley Hope Wind Ltd	High Hedley 1	wind	1.8	2001	North East
	High Hedley 2	wind	5.2	2008	North East
	Trimdon Grange	wind	5.2	2008	North East
	Langley Park	wind	8	2008	North East
	Broomhill	wind	8	2008	North East
Immingham CHP LLP	Immingham CHP	gas CHP	1240	2004	Yorkshire and the Humber
International Power / Mitsui	Indian Queens	gas oil/kerosene	140	1996	South West
	Dinorwig	pumped storage	1,728	1983	Wales
	Ffestiniog	pumped storage	360	1961	Wales
	Rugeley	coal	1,006	1972	West Midlands
	Rugeley GT	gas oil	50	1972	West Midlands
	Deeside	CCGT	500	1994	Wales
	Saltend	CCGT	1,200	2000	Yorkshire and the Humber
Kirkheaton Wind Ltd	Kirkheaton	wind	1.2	2000	North East
K/S Winscales (5)	Winscales 1	wind	2	1999	North West
	Winscales 2	wind	7	2005	North West

For footnotes see page 152

5.11 Power Stations in the United Kingdom (operational at the end of May 2009)⁽¹⁾ (continued)

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
Llangwryfon Windfarm Ltd (5)	Llangwryfon	wind	9	2003 (2)	Wales
Magnox Electric Ltd (4)	Oldbury	nuclear	434	1967	South West
	Wylfa	nuclear	980	1971	Wales
	Fellside CHP	gas CHP	180	1995	North West
	Maentwrog	hydro	28	1928	Wales
Premier Power Ltd	Ballylumford B	gas/oil	540	1968	Northern Ireland
	Ballylumford C	CCGT	616	2003	Northern Ireland
RES-Gen Ltd	Dyffryn Brodyn	wind	6	1994	Wales
	Four Burrows	wind	5	1995	South West
	Forss	wind	2	2003	Scotland
	Forss2	wind	5	2007	Scotland
	Lendrum's Bridge	wind	13	2000	Northern Ireland
	Altahullion	wind	26	2003	Northern Ireland
	Altahullion2	wind	12	2007	Northern Ireland
	Black Hill	wind	29	2006	Scotland
	Lough Hill	wind	8	2007	Northern Ireland
Gruig	wind	25	2009	Northern Ireland	
RGS Energy Ltd	Knapton	gas	40	1994	Yorkshire and the Humber
Rocksavage Power Co. Ltd	Rocksavage	CCGT	748	1998	North West
RWE Npower Plc	Aberthaw B	coal	1,586	1971	Wales
	Tilbury B	coal	1,063	1968	East
	Didcot A	coal/gas	1,958	1972	South East
	Aberthaw GT	gas oil	51	1971	Wales
	Cowes	gas oil	140	1982	South East
	Didcot GT	gas oil	100	1972	South East
	Fawley GT	gas oil	68	1969	South East
	Littlebrook GT	gas oil	105	1982	South East
	Tilbury GT	gas oil	68	1968	East
	Little Barford GT	gas oil	17	2006	East
	Fawley	oil	968	1969	South East
	Littlebrook D	oil	1,370	1982	South East
	Didcot B	CCGT	1,390	1998	South East
	Great Yarmouth	CCGT	420	2001	East
	Little Barford	CCGT	665	1995	East
Npower Renewables Ltd (Part of RWE Npower)	Braevallich	hydro	2	2005	Scotland
	Cwm Dyli	hydro	10	2002 (6)	Wales
	Dolgarrog High Head	hydro	18	2002 (6)	Wales
	Dolgarrog Low Head	hydro	15	1926/2002	Wales
	Garrogie	hydro	2	2005	Scotland
	Inverbain	hydro	1	2006	Scotland
	Kielder	hydro	6	2006 (6)	North East
	Burgar Hill	wind	5	2007	Scotland
	Hameldon Hill	wind	4.5	2007	Northwest
	Bilbster	wind	3.9	2008	Scotland
	Hollies	wind	2.6	2008	East
	Knabs Ridge	wind	16	2008	North East
Little Cheyne	wind	59.8	2008	South East	

For footnotes see page 152

5.11 Power Stations in the United Kingdom (operational at the end of May 2009)⁽¹⁾ (continued)

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
Scottish & Southern Energy plc					
Hydro Schemes:					
Affric/Beaully	Mullardoch Tunnel	hydro	2.4	1955	Scotland
	Fasnakyle	hydro	69	1951	Scotland
	Fasnakyle Compensation Set	hydro	8	2006	Scotland
	Deanie	hydro	38	1963	Scotland
	Culligran	hydro	17	1962	Scotland
	Culligran Compensation Set	hydro	2	1962	Scotland
	Aigas	hydro	20	1962	Scotland
	Kilmorack	hydro	20	1962	Scotland
Breadalbane	Lubreoch	hydro	4	1958	Scotland
	Cashlie	hydro	11	1959	Scotland
	Lochay	hydro	45	1958	Scotland
	Lochay Compensation Set	hydro	2	1959	Scotland
	Finlarig	hydro	17	1955	Scotland
	Lednock	hydro	3	1961	Scotland
	St. Fillans	hydro	17	1957	Scotland
	Dalchonzie	hydro	4	1958	Scotland
Conon	Achanalt	hydro	3	1956	Scotland
	Grudie Bridge	hydro	19	1950	Scotland
	Mossford	hydro	19	1957	Scotland
	Luichart	hydro	34	1954	Scotland
	Orrin	hydro	18	1959	Scotland
	Torr Achilty	hydro	15	1954	Scotland
Foyers	Foyers	hydro/ pumped storage	300	1974	Scotland
Great Glen	Foyers Falls	hydro	5	1968	Scotland
	Mucomir	hydro	2	1962	Scotland
	Ceannacroc	hydro	20	1956	Scotland
	Livishie	hydro	17	1962	Scotland
	Glenmoriston	hydro	39	1957	Scotland
	Glendoe	hydro	100	2008	Scotland
	Quoich	hydro	18	1955	Scotland
	Invergarry	hydro	20	1956	Scotland
	Kingairloch	hydro	4	2005	Scotland
Shin	Cassley	hydro	10	1959	Scotland
	Lairg	hydro	4	1959	Scotland
	Shin	hydro	19	1958	Scotland
	Loch Dubh	hydro	1	1954	Scotland
Sloy/Awe	Sloy	hydro	153	1950	Scotland
	Sron Mor	hydro	5	1957	Scotland
	Clachan	hydro	40	1955	Scotland
	Allt-na-Lairige	hydro	6	1956	Scotland
	Nant	hydro	15	1963	Scotland
	Inverawe	hydro	25	1963	Scotland
	Kilmelfort	hydro	2	1956	Scotland
	Loch Gair	hydro	6	1961	Scotland
	Lussa	hydro	2	1952	Scotland
	Striven	hydro	8	1951	Scotland
Tummel	Gaur	hydro	8	1953	Scotland
	Cuaich	hydro	3	1959	Scotland
	Loch Ericht	hydro	2	1962	Scotland
	Rannoch	hydro	45	1930	Scotland
	Tummel	hydro	34	1933	Scotland
	Errochty	hydro	75	1955	Scotland

For footnotes see page 152

5.11 Power Stations in the United Kingdom (operational at the end of May 2009)⁽¹⁾ (continued)

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
	Clunie	hydro	61	1950	Scotland
	Pitlochry	hydro	15	1950	Scotland
Wind	Artfield Fell	wind	20	2005	Scotland
	Bu	wind	3	2002	Scotland
	Hadyard Hill	wind	120	2005	Scotland
	Spurness	wind	8	2004	Scotland
	Tangy	wind	19	2002	Scotland
	Dalswinton	wind	30	2008	Scotland
	Drumderg	wind	32	2008	Scotland
	Minsca	wind	37	2008	Scotland
	Bessy Bell	wind	9	2008	N Ireland
	Bin Mountain	wind	9	2008	N Ireland
	Slieve Divena	wind	30	2008	N Ireland
	Tappaghan	wind	20	2008	N Ireland
	Beatrice	wind (offshore)	10	2007	Scotland
Small Hydros:	Chliostair	hydro	1	1960	Scotland
	Cuileig	hydro	3	2002	Scotland
	Kerry Falls	hydro	1	1951	Scotland
	Loch Dubh	hydro	1	1954	Scotland
	Nostie Bridge	hydro	1	1950	Scotland
	Storr Lochs	hydro	2	1952	Scotland
Thermal:	Peterhead (B)	gas/oil	1,540	1980	Scotland
	Fife Power Station	gas	123	2000	Scotland
	Keadby	gas/oil	749	1994	Yorkshire and the Humber
	Medway	CCGT	688	1995	South East
	Ferrybridge C	coal/biomass	1,960	1966	Yorkshire and the Humber
	Fiddler's Ferry	coal/biomass	1,980	1971	North West
	Ferrybridge GT	gas oil	34	1966	Yorkshire and the Humber
	Fiddler's Ferry GT	gas oil	34	1969	North West
Thermal (continued)	Chickerell	gas/oil	45	1998	South West
	Burghfield	gas/oil	47	1998	South East
	Thatcham	light oil	10	1994	South East
	Five Oaks	light oil	9	1995	South East
	Chippenham	gas	10	2002	South West
	Wheldale	mines gas	8	2002	Yorkshire and the Humber
Island Generation	Arnish	diesel	3	2001	Scotland
	Barra	diesel	2	1990	Scotland
	Bowmore	diesel	6	1946	Scotland
	Kirkwall	diesel	16	1953	Scotland
	Lerwick	diesel	67	1953	Scotland
	Loch Carnan, South Uist	diesel	10	1971	Scotland
	Stornoway	diesel	26	1950	Scotland
	Tiree	diesel	3	1945	Scotland
Scottish Power					
Hydro schemes:					
Galloway	Carsfad	hydro	12	1936	Scotland
	Drumjohn	hydro	2	1985	Scotland
	Earlstoun	hydro	14	1936	Scotland
	Glenlee	hydro	24	1935	Scotland
	Kendoon	hydro	24	1936	Scotland
	Tongland	hydro	33	1935	Scotland

For footnotes see page 152

5.11 Power Stations in the United Kingdom (operational at the end of May 2009)⁽¹⁾ (continued)

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
Scottish Power					
Hydro schemes continued:					
Lanark	Bonnington	hydro	11	1927	Scotland
	Stonebyres	hydro	6	1927	Scotland
Cruachan	Cruachan	pumped storage	440	1966	Scotland
Thermal:					
	Cockenzie	coal	1,152	1967	Scotland
	Longannet	coal	2,304	1970	Scotland
	Damhead Creek	CCGT	800	2000	South East
	Pilkington - Greengate	gas	10	1998	North West
	Ravenhead	gas	9	1999	North West
	Rye House	CCGT	715	1993	East
	Shoreham	CCGT	400	2000	South East
	Wind:				
	Barnesmore	wind	15	1997	Northern Ireland
	Beinn an Tuirc	wind	30	2001	Scotland
	Beinn Tharsuinn	wind	30	2007	Scotland
	Black Law	wind	124	2005	Scotland
	Callagheen	wind	17	2006	Northern Ireland
	Carland Cross	wind	6	1992	South West
	Coal Clough	wind	10	1992	North West
	Coldham	wind	16	2006	East
	Corkey	wind	5	1994	Northern Ireland
	Cruach Mhor	wind	30	2004	Scotland
	Dun Law	wind	17	2000	Scotland
	Elliots Hill	wind	5	1995	Northern Ireland
	Greenknowes	wind	27	2008	Scotland
	Hagshaw Hill	wind	16	1995	Scotland
	Hare Hill	wind	13	2000	Scotland
	Penryddian & Llidiartywaun	wind	31	1992	Wales
	Rigged Hill	wind	5	1994	Northern Ireland
	Wether Hill	wind	18	2007	Scotland
	Whitelee	wind	23	2007	Scotland
		Wolf Bog	wind	10	2008	Northern Ireland
Seabank Power Limited	Seabank 1	CCGT	812	1998	South West
	Seabank 2	CCGT	410	2000	South West
South East London Combined Heat & Power Ltd	SELCHP ERF	waste	32	1994	London
Spalding Energy Company Ltd	Spalding	CCGT	860	2004	East Midlands
Uskmouth Power Company Ltd	Uskmouth	coal/biomass	363	2000	Wales
Vattenfall Wind Power	Kentish Flats	wind (offshore)	90	2005	South East
Western Power Generation	Lynton	gas oil	2	1961	South West
	Princetown	kerosene	3	1959	South West
	Roseland	kerosene	5	1963	South West
	St Marys	gas oil	6	1958	South West
Yorkshire Windpower Ltd	Ovenden Moor	wind	9	1993	Yorkshire and the Humber
	Royd Moor	wind	7	1993	Yorkshire and the Humber
Total			78,835		

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5.11 Power Stations in the United Kingdom (operational at the end of May 2009)⁽¹⁾ (continued)

Other power stations⁽⁹⁾

Station type	Fuel	Capacity (MW)
Renewable sources	wind	1052
and combustible wastes	landfill gas	908
	sewage gas	152
	hydro	242
	waste	344
	other	216
CHP schemes listed in Table 5.12	various fuels	2104
CHP schemes other than major power producers and renewables and those listed in Table 5.12	mainly gas	1614
Other autogenerators	various fuels	890

Interconnectors

	Capacity (MW)
England - France	2,000
Scotland - Northern Ireland	500
Northern Ireland - Irish Republic	600

Footnotes

- (1) This list covers stations of more than 1 MW capacity, but excludes some renewables stations of over 1 MW which are included in the sub table on page 152.
- (2) Joint venture with Scottish and Southern Energy
- (3) Managed by RWE
- (4) Owned by NDA but operated by Magnox Electric Ltd
- (5) Managed by Cumbria Wind Farms Ltd
- (6) Recommissioning dates.
- (7) Animal Waste Derived Fuel, i.e. meat and bone meal, poultry litter, feathers and small quantities of other material such as wood chips
- (8) Total capacity is 2,370 MW but because of transmission constraints only 1,540 MW can be used at any one time.
- (9) As at end December 2008.

5.12 Large scale CHP schemes in the United Kingdom (operational at the end of December 2008)⁽¹⁾

Company Name	Scheme Location	Installed Capacity (MWe) (2)
ABB CHP Ltd	Royal Devon and Exeter NHS Trust Wonsford Hospital	1.0
Airbus UK	Broughton, Cheshire	6.3
Alta Estate Services Limited	The University of Birmingham	5.9
Archer Daniels Midland Ltd (ADM Ltd)	Erith, Kent	14.0
Arjo Wiggins Chartham Ltd	Chartham Paper Mill, Arjo Wiggins Chartham Ltd	6.1
Arjo Wiggins Ltd	Dartford, Kent	10.0
Atkins Power	Stubbins Marketing, Fen Drayton	3.1
Atkins Power	Park Lane Nursery, East Yorkshire	2.0
Atkins Power	Glen Avon Growers, Cottingham, North Humberside	3.0
Atkins Power	Anchor Nurseries Ltd, Beverley	3.1
Atkins Power	Villa Nurseries, Roydon, Essex	3.1
Atkins Power	Waltham Abbey, Essex	3.1
Atkins Power	Cleveland Nurseries, Cleveland	4.5
Atkins Power	Tower Nursery, Roydon, Essex	3.1
Atkins Power	Poolbank Salads, Brough	3.9
Atkins Power	Abbey View Nurseries, Waltham Abbey, Essex	3.1
Balcas Ltd	Laragh, Ballycassidy, Enniskillen	2.7
Banham PoultryLtd	Banham	2.4
BHP Billiton	Point of Ayr Terminal	9.1
Bloomsbury CHP	SOAS, London	1.5
BP CHP (UK) Ltd	Polimerieuropa, Hythe	53.0
British Sugar Plc	Cantley Sugar Factory	14.7
British Sugar plc	Wissington, Norfolk	93.6
British Sugar plc	Newark, Nottinghamshire	10.0
British Sugar plc	Bury St Edmunds, Suffolk	90.1
Carron Engineering and Construction Ltd	Mill Nurseries, Keyingham, Hull	15.0
CIBA Speciality Chemicals plc	Low Moor, Bradford	16.5
Crisp Maltings Ltd	Fakenham, Norfolk	1.2
Dalkia Clean Power Ltd	Fribo Foods, Wrexham	1.4
Dalkia Clean Power Ltd	Sonoco, Stainland Board Mills, Halifax	7.1
Dalkia Plc	Lincoln County Hospital	1.4
Dalkia Utilities Services	Southampton General Hospital	2.1
Dalkia Utilities Services	Kingston Hospital	1.4
Dalkia Utility Services	Astra-Zeneca, Macclesfield	22.8
Dalkia Utility Services	Leeds General Infirmary	18.9
Dalkia Utility Services	Queen Elizabeth Hospital, Edgbaston, Warwickshire	3.5
Diageo Distilling Ltd	Port Dundas, Glasgow	5.9
DSM Nutritional Products UK Ltd	Dalry, Ayrshire	45.8
E.On UK (CHP) Ltd	Iggesund Paperboard, Workington	47.8
E.On UK (CHP) Ltd	Grovehurst Energy Ltd, Sittingbourne, Kent	80.6
E.On UK (Cogeneration) Ltd	Port of Liverpool	31.0
E.On UK Chp Limited	Stoke Chp, Michelin Tyre Plc	61.1
E.On UK Chp Limited	Brunner Mond (UK) Limited	146.1
Ed&F Man Ltd (Man Group Plc)	Sugar Quay	1.0
Elyo (UK) Ltd	Trafford Park, Kellogg Company Of Great Britain	5.2
Elyo Ltd	Hillhouse International, Lancashire	5.1
Enviroenergy Ltd	Nottingham District Heating Scheme	14.4
Excel - London	Excel Energy Centre	1.4
Gdf Suez Shotton Limited	Shotton Chp, Gdf Suez Shotton Ltd	213.5
Genzyme td	Haverhill, Suffolk	1.4
GlaxoSmithKline Ltd	Ulverston, Cumbria	2.3
Humber Energy	Grimsby, South Humberside	48.4
Hydro Polymers Ltd	Newton Aycliffe, Durham	9.8
INBEV UK Ltd	Salmesbury Brewery, Preston	6.7
INBEV UK Ltd	Magor Brewery, South Wales	6.7
Ineos Chlor	Runcorn, Cheshire	38.4
Jaguar Cars Ltd	Castle Bromwich	6.2
James Cropper Ltd	Kendal, Cumbria	7.0

For footnotes see page 155

5.12 Large scale CHP schemes in the United Kingdom (operational at the end of December 2008)⁽¹⁾ (continued)

Company Name	Scheme Location	Installed Capacity (MWe) (2)
John Dickens BD	Becton Dickinson, Plymouth	3.0
John Thompson and Company	Belfast	2.7
Johnson Matthey	Royston	6
Johnson Matthey	Enfield	2.9
Laporte Industries	Fine Organics Ltd, Seal Sands	4.1
North Tees and Hartlepool NHS Trust	North Tees General Hospital, Hartlepool	1.6
Novartis	Grimsby, South Humberside	8.4
Npower Cogen Ltd	Basf Chp C/O Basf Plc	97.5
Npower Cogen Ltd	Sca Hygiene Chp C/O Sca Hygiene Products Ltd	6.9
Npower Cogen Ltd	Bridgewater Paper, Ellesmere Port, South Wirral	58.0
Npower Cogen Ltd	Aylesford Newsprint, Kent	99.8
Npower Cogen Ltd	Conoco Phillips Teesside Operations	97.3
Npower Cogen Ltd	Dow Corning, Barry	27.2
Npower Cogen Ltd	Georgia Pacific, Bridgend Paper Mills, Llangynwyd,	9.0
Npower Cogen Ltd	Millenium Organic Chemicals, Stallingborough	15.8
Npower Cogen Ltd	Lancaster University	1.4
Npower Cogen Ltd	Huntsman Tioxide, Grimsby	20.3
Npower Cogen Trading Ltd	Fawley, Hampshire	316.0
Portals Ltd	Overton Mill, Hampshire	7.4
Prime Energy (MK) Ltd	Ordnance Survey, Southampton	1.7
Prosper De Mulder	Hartshill	2.9
Rigid Paper Ltd	Selby	5.1
Roquette UK Ltd	Corby	14.5
Ryobi Aluminium Castings (UK) Ltd	Carrickfergus, Co Antrim	1.4
Scottish and Southern Energy plc	Hedon Salads, Newport	3.9
Scottish and Southern Energy plc	Koopers UK Ltd, Port Clarence, Teesside	1.9
Scottish and Southern Energy plc	West End Nursery, Woking	2.0
Scottish and Southern Energy plc	Runton Nursery, Chichester	4.0
Scottish and Southern Energy plc	Bradon Farm, Taunton, Somerset	9.7
Scottish and Southern Energy plc	Red Roofs, Cottingham, Yorks	3.4
Scottish and Southern Energy plc	Hedon Salads, Burstwick	10.0
Scottish and Southern Energy plc	Western General Hospital, Edinburgh	1.0
Severn Trent Water Ltd	Minworth Sewage Treatment Works (Stw)	7.5
Shell Oil Products Ltd	Stanlow Manufacturing Complex, Cheshire	109.3
Smurfit Kappa SSK Ltd	Nechells, Birmingham	8.7
Southampton Geothermal	Southampton	6.4
St Georges's Healthcare NHS Trust	St George's Hospital, Tooting, London	4.4
Sustainable and Renewable Energy	Woking, Surrey	1.4
Syngenta Limited	Huddersfield Works, Syngenta Ltd	16.3
Tangmere Airfield Nurseries Ltd	Tangmere, Sussex	8.8
Tate and Lyle Europe	Thames Refinery, Silvertown, London	19.5
Thames Valley Power Ltd	Heathrow Airport	15.0
Thames Water Utilities	Long Reach Sewage Treatment Works, Kent	3.5
Thames Water Utilities	Rye Meads Sewage Treatment Works, Hertfordshire	1.5
Thames Water Utilities	Maple Lodge Sewage Treatment Works, Hertfordshire	3.8
Thames Water Utilities	Deephams Sewage Treatment Works, Edmonton, London	3.3
Thames Water Utilities	Reading (Island Road) Sewage Treatment Works, Reading	1.0
Thames Water Utilities	Mogden Treatment Works, London	8.3
Thames Water Utilities	Beddington Lane Sewage Treatment Works, Croydon,	3.3
Thamesway Energy Ltd	Tcmk Phase 1 CHP, Midsummer Boulevard, Milton Keynes	3.0
The Boots Company plc	Beeston, Nottingham	14.1
UEA Utilities Ltd	University of East Anglia, Norwich	3.1
University of Bristol	Bristol	1.2
University of Dundee	Dundee	3.0
University of Edinburgh	George Square Energy Centre, Edinburgh	1.6
University of Edinburgh	Kings Building, Edinburgh	2.7

For footnotes see page 155

5.12 Large scale CHP schemes in the United Kingdom (operational at the end of December 2008)⁽¹⁾ (continued)

Company Name	Scheme Location	Installed Capacity (MWe) (2)
University of Southampton	Southampton	2.8
University of Surrey	Guildford, Surrey	1.0
University Of Sussex	University Of Sussex	1.2
University of Warwick	Warwickshire	4.2
Upm Kymmene (Uk) Ltd	Upm Shotton	21.5
Utilicom Ltd	University College, London	2.9
Weetabix Ltd	Burton Latimer, Northants	6.1
Wessex Water	Bristol Waste Water Treatment Works	5.8
Total (2)		2,372.2
Electrical capacity of good quality CHP for these sites in total		2,103.9

(1) These are sites of 1 MW installed electrical capacity or more that either have agreed to be listed in the Ofgem register of CHP plants or whose details are publicly available elsewhere, or who have provided the information directly to DECC. It excludes CHP sites that have been listed as major power producers in Table 5.11.

(2) This is the total power capacity from these sites and includes all the capacity at that site, not just that classed as good quality CHP under CHPQA.



Chapter 6

Combined heat and power

Introduction

6.1 This chapter sets out the contribution made by Combined Heat and Power (CHP) to the United Kingdom's energy requirements. The data presented in this chapter have been derived from information submitted to the CHP Quality Assurance programme (CHPQA) or by following the same procedures where no information has been provided directly. The CHPQA programme was introduced by the Government to provide the methods and procedures to assess and certify the quality of the full range of CHP schemes. It is a rigorous system for the Government to ensure that the incentives on offer are targeted fairly and benefit schemes in relation to their environmental performance.

6.2 CHP is the simultaneous generation of usable heat and power (usually electricity) in a single process. The term CHP is synonymous with cogeneration, which is commonly used in other Member States of the European Community and the United States. CHP uses a variety of fuels and technologies across a wide range of sizes and applications. The basic elements of a CHP plant comprise one or more prime movers (a reciprocating engine, gas turbine, or steam turbine) driving electrical generators, with the heat generated in the process captured and put to further productive use, such as for other industrial processes, hot water and space heating or cooling.

6.3 CHP is typically sized to make use of the available heat¹, and connected to the lower voltage distribution system (i.e. embedded). This means that unlike conventional power stations, CHP can provide efficiency gains by avoiding significant transmission and distribution losses. CHP can also provide important network services such as black start, improvements to power quality, and some have the ability to operate in island mode if the grid goes down. There are four principal types of CHP system: steam turbine, gas turbine, combined cycle systems and reciprocating engines. Each of these is defined in paragraph 6.33 later in this chapter.

Government policy towards CHP

6.4 Good Quality CHP denotes schemes that have been certified as being highly efficient through the UK's CHP Quality Assurance (CHPQA) programme. The criteria used are in line with the requirements for high efficiency CHP set down in the EU Cogeneration Directive (2004/8/EC). A Good Quality CHP plant must achieve 10 per cent primary energy savings compared to the separate generation of heat and power i.e. via a boiler and power station. Only Good Quality CHP schemes are eligible for Government support.

6.5 To reduce carbon emissions and help deliver the UK's Climate Change Programme, the Government has a target of achieving at least 10,000 MWe of Good Quality CHP capacity (GQCHP) by the end of 2010.

6.6 Since 2001, the Government has introduced a range of support measures to incentivise the growth of Good Quality CHP in the UK. These include:

- Exemption from the Climate Change Levy (CCL) of all fuel inputs to, and electricity outputs from, Good Quality CHP.
- Eligibility to Enhanced Capital Allowances for Good Quality CHP plant and machinery.
- Favourable allocations of carbon allowances under Phase II of the EU Emissions Trading Scheme (EU ETS)
- Business Rates exemption for CHP power generation plant and machinery.
- Reduction of VAT (from 17.5 to 5 per cent) on domestic micro-CHP installations.
- Extension of the eligibility for Renewable Obligation Certificates (ROCs) to energy from waste plants that utilise CHP.

¹ But not always, see paragraph 6.10. In such cases there is an impact upon the electrical capacity and electrical output classified as CHP.

- Increased support under the Renewables Obligation from with two ROCs allocated to the Good Quality electricity output of CHP fuelled by biomass.
- In April 2010 the Carbon Reduction Commitment (CRC) will come into force. The CRC is a mandatory emissions trading scheme that will cover large, non-energy intensive business, currently not covered under other policy measures like Climate Change Agreements (CCAs) and the EU ETS. In the CRC, organisations covered will be required to purchase allowances to cover the CO₂ emissions from all fixed-point energy sources. This means that allowances must be purchased to cover the use of electricity, gas and all other fuel types such as Liquefied Petroleum Gas (LPG) and diesel. However, under CRC heat is zero-rated, meaning that allowances will not have to be purchased by a site to cover any imported heat. It is expected that this treatment will stimulate a growth in the heat market, and this will in turn incentivise the use of CHP. From 2013, the first capped phase will commence and allowances will be sold to participants by auction.

International context

6.7 The EU-ETS commenced on 1st January 2005 and involves the trading of carbon emissions allowances. The purpose of the EU-ETS is to reduce emissions by a fixed amount at least cost to the regulated sources. Each year participants in the scheme are allocated a set number of allowances. At the end of each trading year allowances equal to the reported emissions must be given up. In the EU-ETS Phase I National Allocation Plan (NAP), the sectoral classification of CHP plant depended on the sector in which it was modelled in DTI's Updated Energy Projections (UEP) and the presence of CHP at an installation was not considered explicitly in their allocation calculations. The sector in which an installation is classified has an effect on the level of its allocation, because allocations are calculated on the basis of sectoral growth projections. It was argued that this method of allocation would have an impact on CHP because its future growth and emissions are different to those of non-CHP installations in Phase I sectors. For this reason the Government decided to create a specific sector for GQCHP in Phase II, to ensure that incumbent CHP plant would not be disincentivised and to ensure that investment in GQCHP would be encouraged by the implementation of Phase II. Phase II runs from January 2008- December 2012.

6.8 All sites wishing to be included in the CHP sector were required to submit to CHPQA in 2006. This was to enable the Qualifying Power Capacity (QPC) to be determined for all schemes, and was necessary to ensure that the correct number of allocations was made to individual sites in the CHP sector. A consequence of this was that a number of sites that had previously not submitted to CHPQA, on the grounds that there were no fiscal benefits to accrue to them from the CHPQA process, submitted to CHPQA for the first time in 2006. This made available for the first time accurate data on capacities and energy inputs and outputs for these schemes. Where corrections were necessary, they were made back in time and revised historical data incorporating these corrections were presented in the 2007 Digest. The details of these corrections were provided in paragraph 6.31 of the 2007 Digest which is available on the DECC Energy web site at

www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

UK energy markets, and their effect on CHP²

6.9 Two major factors affecting the economics of CHP are the relative cost of fuel (principally natural gas) and the value that can be realised for electricity. Energy price trends that are applicable to CHP schemes differ depending upon the size and sector of the scheme. During the last few years there has been an improving trend in the viability of CHP due to a decrease in the price of gas relative to that of electricity. This is known as the spark gap (i.e. the difference between the price of electricity and the price of the gas required to generate that electricity). Due to the long term nature of CHP investments, it is not appropriate to correlate changes in CHP capacity with short term changes in the spark gap. Longer term trends in the spark gap are more instructive for this purpose and it is worth noting that the spark gap remains narrow in historical terms.

² Reference source for price trends is DECC's 'Quarterly Energy Prices March 2009. Table 3.3.2', available at www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx

Use of CHPQA in producing CHP statistics

6.10 The CHPQA programme is the major source for CHP statistics. The following factors need to be kept in mind when using the statistics produced:

- Through CHPQA, scheme operators have been given guidance on how to determine the boundary of a CHP scheme (what is regarded as part of the CHP installation and what is not). A scheme can include multiple CHP prime movers, along with supplementary boilers and generating plant, subject to appropriate metering being installed to support the CHP scheme boundaries proposed, and subject to appropriate metering and threshold criteria. (See CHPQA Guidance Note 11 available at www.chpqa.com).
- The output of a scheme is based on gross power output, ignoring parasitic loads (i.e. ignoring power used in pumps, fans, etc. within the scheme itself).
- The main purpose of a number of CHP schemes is the generation of electricity including export to others. Such schemes may not be sized to use all of the available heat. In such cases, the schemes' total electrical capacity and electrical output have been scaled back using the methodologies outlined in CHPQA. Only the portion of the electrical capacity and electrical output that qualifies as Good Quality is counted in this chapter. The remaining electrical capacity and electrical output are regarded as power only, and these are reported in Chapter 5 as part of 'Other Generators'. The fuel allocated to the power-only portion of the output is calculated from the power efficiency of the prime mover.
- The load factor presented in Table 6A is based on the Good Quality Power Output and Good Quality Power Capacity reported in this Chapter. For schemes that are scaled back, this load factor is likely to be smaller than the actual load factor (hours run) for the prime mover in these schemes. The load factor of all schemes between 2007 and 2008 was unchanged and there was a slight increase in the overall efficiency.

Table 6A: A summary of the recent development of CHP⁽¹⁾

	Unit	2004	2005	2006	2007	2008
Number of schemes		1,340	1,372	1,378	1,435	1,439
<i>Net No. of schemes added during year (2)</i>		-12	32	6	57	4
Electrical capacity (CHP _{QPC})	MWe	5,397	5,534	5,434	5,450	5,469
<i>Net capacity added during year</i>		902	137	-100	16	19
<i>Capacity added in percentage terms</i>	Per cent	20.1	2.5	-1.8	0.3	0.3
Heat capacity	MWth	11,773	11,500	11,211	11,091	10,924
Heat to power ratio (3)		2.10	1.96	1.86	1.84	1.87
Fuel input (4)	GWh	120,188	124,616	122,371	118,664	119,121
Electricity generation (CHP _{QPO})	GWh	26,855	28,831	28,738	27,851	27,911
Heat generation (CHP _{QHO})	GWh	56,524	56,448	53,418	51,323	52,197
Overall efficiency (5)	Per cent	69.4	68.4	67.1	66.7	67.2
Load factor (4)	Per cent	56.8	59.5	60.4	58.3	58.3

(1) All data in this table for 2004 to 2008 have been revised since last year's Digest – see paragraph 6.11.

(2) Net number of schemes added = New schemes – Decommissioned existing schemes

(3) Heat to power ratios are calculated from the qualifying heat output (QHO) and the qualifying power output (QPO).

(4) The load factor reported in this table is based on the qualifying power generation and capacity and does not correspond exactly to the number of hours run by the prime movers in a year (see paragraph 6.10).

(5) These are calculated using gross calorific values; overall net efficiencies are some 5 percentage points higher.

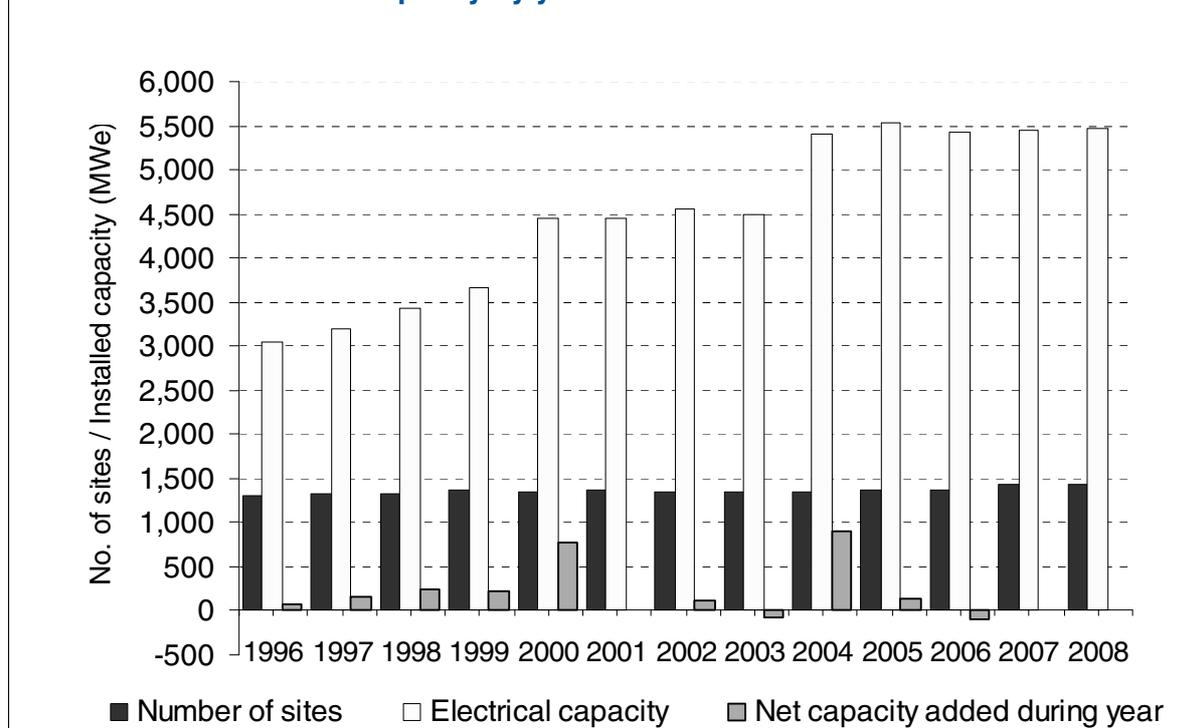
Progress towards the Government's targets

6.11 Chart 6.1 shows the change in installed CHP capacity over the last thirteen years. Installed capacity at the end of 2008 stood at 5,469 MWe. There was a net increase of 4 schemes between 2007 and 2008 and a net increase of 19 MWe in installed capacity.

Installed capacity and output in 2008

6.12 During 2008 22 new CHP schemes came into operation. 18 CHP schemes that were operating in 2007 subsequently closed and did not operate in 2008. This resulted in a net increase of 4 schemes between 2007 and 2008.

Chart 6.1: Installed CHP capacity by year



6.13 In the current market conditions, a number of operators have chosen to mothball their CHP schemes rather than continue to operate. As these schemes are still able to operate they have been included in the capacity figures. At the end of 2008, there were 97 mothballed schemes with a Good Quality capacity of 85 MWe.

6.14 Table 6A gives a summary of the overall CHP market. The electricity generated by CHP schemes in 2008 was 27,911 GWh. This represents a little over 7 per cent of the total electricity generated in the UK. Across the commercial and industrial sectors (including the fuel industries other than electricity generation) electrical output from CHP accounted for around 12 per cent of electricity consumption. CHP schemes in total supplied 52,197 GWh of heat in 2008.

6.15 In terms of electrical capacity by size of scheme, schemes larger than 10 MWe represent over 82 per cent of the total electrical capacity of CHP schemes as shown in Table 6B. However, in terms of number of schemes, the largest share (>80 per cent) is in schemes less than 1 MWe. Schemes of 1 MWe or larger, make up approximately 19 per cent of the total number of schemes. Table 6.5 provides data on electrical capacity for each type of CHP installation and the map on page 160 shows how these schemes are located around the country.

Table 6B: CHP schemes by capacity size ranges in 2008

Electrical capacity size range	Number of schemes	Share of total (per cent)	Total electricity capacity (MWe)	Share of total (per cent)
Less than 100 kWe	462	32.1	29	0.5
100 kWe - 999 kWe	707	49.1	185	3.4
1 MWe - 9.9 MWe	200	13.9	723	13.2
Greater than 10 MWe	70	4.9	4,532	82.9
Total	1,439	100.0%	5,469	100.0

6.16 Seventy eight per cent of electrical capacity is now gas turbine based³, with about 85 per cent of this (66 per cent in total) in combined cycle mode. After combined cycle, reciprocating engines represent the second largest technology in terms of installed electrical capacity, closely followed by open cycle gas turbines, both with very similar individual shares of total installed capacity. Table 6.7 provides data on heat capacity for each type of CHP installation. Combined Cycle Gas Turbine (CCGT) schemes also account for 49 per cent of total heat capacity. Over the years there has been a clear downward trend in the capacity of back pressure and pass-out condensing steam turbines.

Fuel used by types of CHP installation

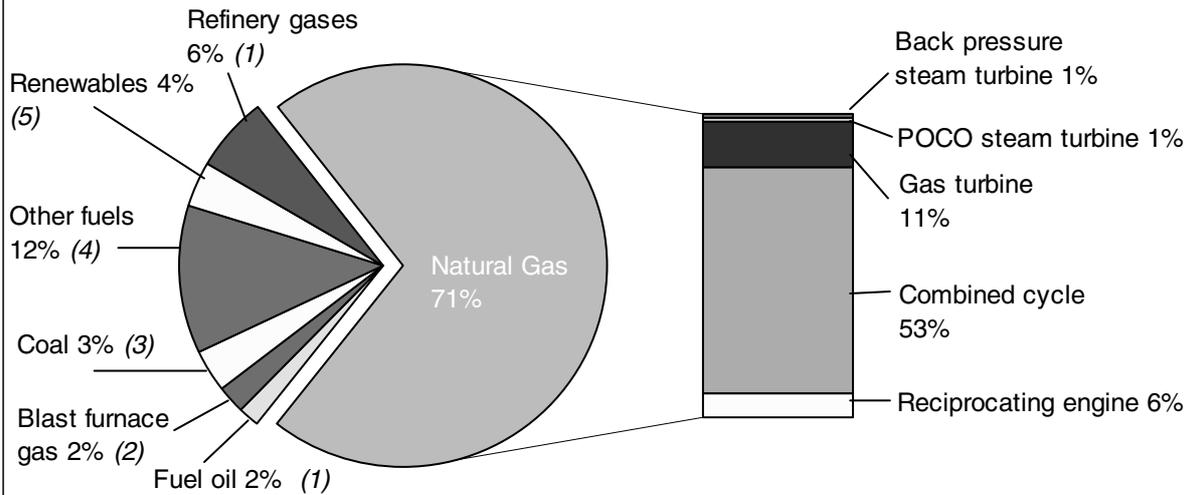
6.17 Table 6.2 shows the fuel used to generate electricity and heat in CHP schemes, (see paragraphs 6.34 to 6.36, below for an explanation of the convention for dividing fuel between electricity and heat production). Table 6.3 gives the overall fuel used by types of CHP installation (which are explained in paragraph 6.33). Total fuel use is summarised in Chart 6.2. In 2008, 71 per cent of the total fuel use was natural gas, which is approximately the same proportion as was used in 2007. CHP schemes accounted for 8 per cent of UK gas consumption in 2008 (see Table 4.3). Over the last few years the refineries sector has seen a decrease in the use of heavy fuel oil and an increase in the use of refinery gas and natural gas. This may be a reflection of the rise in the market value of heavy fuel oil over this same time period. A refinery selling rather than burning the heavy fuel oil it produces, and substituting this with lower value refinery gas and natural gas, the latter having increased in value less than fuel oil, would likely increase its revenue.

6.18 In 2008, there was a noticeable increase in the use of renewable fuels (see Table 6.2) and, for the first time, use of renewable fuels is now higher than use of coal.

6.19 Non-conventional fuels (liquids, solids or gases which are by-products or waste products from industrial processes, or are renewable fuels) account for 24 per cent of all fuel used in CHP in 2008. Some of these are fuels that are not commonly used by the mainstream electricity generating industry, and some would otherwise be flared or disposed of by some means. These fuels, with the exception of some waste gases, will generally be utilised in steam turbines being fed by boilers. In almost all cases, the technical nature of the combustion process, and the lower fuel quality (lower calorific value of the fuel, high moisture content of the fuel, the need to maintain certain combustion conditions to ensure complete disposal etc.) will generally result in a lower efficiency. However, given that the use of such fuels avoids the use of fossil fuels, and since they need to be disposed of in some way, the use of these fuels in CHP provides environmental benefits.

³ See table 6.5 Gas turbine and Combined cycle.

Chart 6.2: Types of fuel used by CHP schemes in 2008



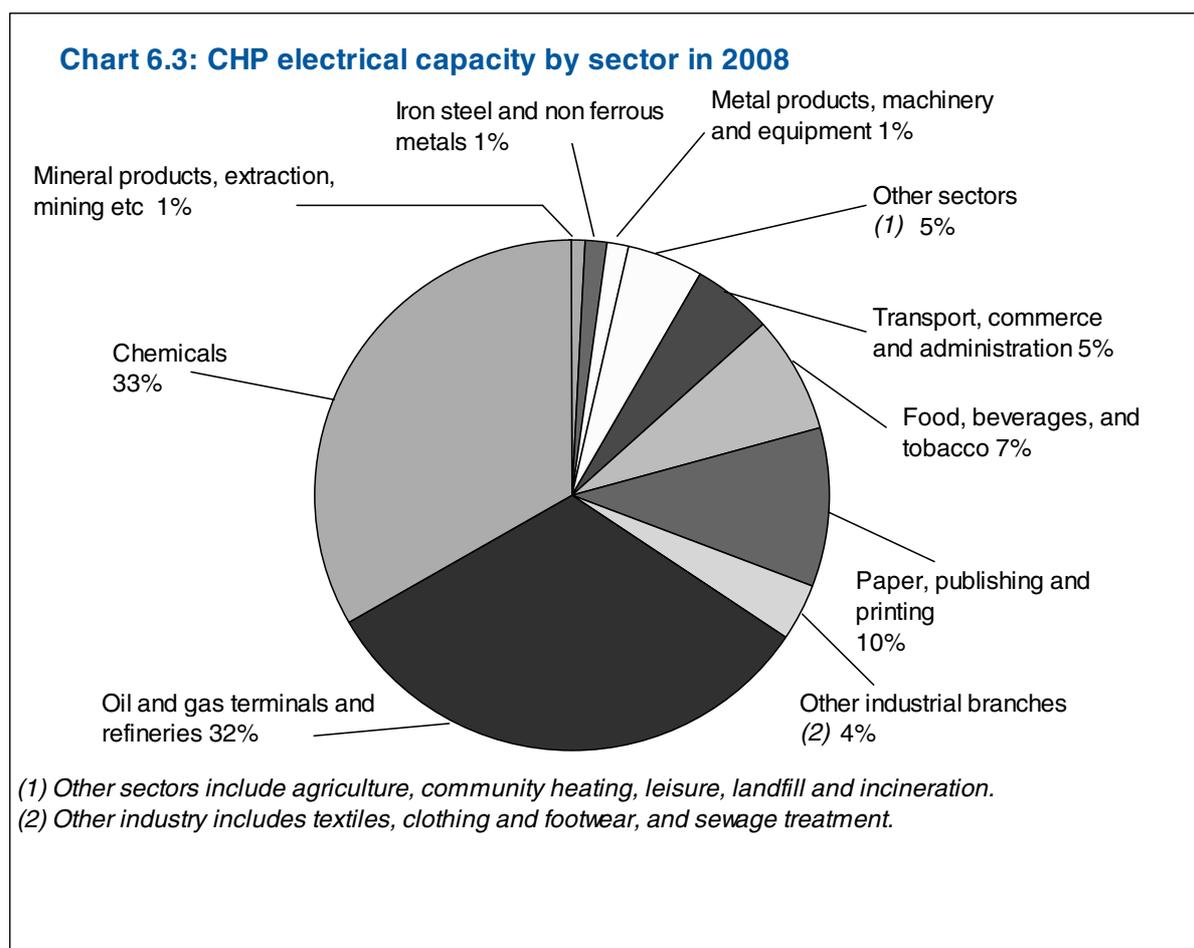
- (1) Combined cycle accounts for 71 per cent of fuel oil use and around two thirds of refinery gas use.
 (2) POCO steam turbines account for all blast furnace gas use.
 (3) Over 70 per cent of coal use is in POCO steam turbines.
 (4) Other fuels include coke oven gas, gas oil and process by-products.
 (5) Reciprocating engines and BPST each account for about 35 per cent of renewable fuel use.

CHP capacity, output and fuel use by sector

6.20 In this chapter of the Digest CHP is allocated to the sector using the heat, or, where the heat is sent to users in more than one sector, to the sector taking the majority of the heat. This method of assigning a CHP scheme to a sector was rigorously applied for the first time in DUKES 2008 and resulted in the movement of CHP schemes between sectors. One consequence of this was the removal of all schemes once allocated to the “electricity supply” sector and their distribution to other sectors. Full details of this reassignment are provided in paragraph 6.33 and Table 6J of DUKES 2008.

6.21 Table 6.8 gives data on all operational schemes by economic sector. A definition of the sectors used in this table can be found in Chapter 1, paragraph 1.57 and Table 1F:

- 332 schemes (90 per cent of electrical capacity) are in the industrial sector and 1,107, schemes (10 per cent of capacity) are in the agricultural, commercial, public administration, residential and transport sectors.
- Three industrial sectors account for almost 76 per cent of the CHP electrical capacity – chemicals (33 per cent), oil refineries (32 per cent of capacity), and paper and publishing and printing (10 per cent). Capacity by sector is shown in Chart 6.3.



6.22 Table 6C gives a summary of the 987 schemes installed in the commercial, public sector and residential buildings. These schemes form a major part of the “Transport, commerce and administration” and “Other” sectors in Tables 6.8 and 6.9. The vast majority of these schemes are based on spark ignition reciprocating engines fuelled with natural gas, though the larger schemes use compression ignition reciprocating engines or gas turbines. The largest proportion of the capacity is in

Table 6C: Number and capacity of CHP schemes installed in buildings by sector in 2008

	Number of schemes	Electrical capacity (MWe)	Heat capacity (MWth)
Leisure	394	50.0	54.8
Hotels	254	36.0	45.4
Health	187	124.2	190.4
Residential Group Heating	40	27.7	61.0
Universities	41	50.0	83.8
Offices	17	15.0	12.0
Education	17	10.0	17.7
Government Estate	17	15.9	18.6
Retail	17	4.6	3.4
Other (1)	3	10.5	18.7
Total	987	344.0	505.7

(1) All schemes under Other are at airports

the health sector, mainly hospitals. Leisure and hotels account for nearly two-thirds of the total number of schemes but only about 25 per cent of the electrical capacity. Table 6.9 gives details of the quantities of fuels used in each sector.

CHP performance by main prime mover

6.23 Table 6D gives a summary of the performance of schemes in 2008 by main prime mover type. Combined cycle gas turbines have the highest average operating hours at 5,510 hours per annum. The average for all schemes of 5,104 hours is lower than in 2007 (5,239 hours).

6.24 The average electrical efficiency is 23 per cent and heat efficiency 44 per cent, giving an overall average of 67 per cent (all measured on a gross calorific value (GCV) basis).

Table 6D: A summary of scheme performance in 2008

	Average operating hours per annum (Full load equivalent)	Average electrical efficiency (% GCV)	Average heat efficiency (% GCV)	Average overall efficiency (% GCV)	Average heat to power ratio
Main prime mover in CHP plant					
Back pressure steam turbine	4,945	12	63	74	5.4
Pass out condensing steam turbine	3,905	14	44	58	3.2
Gas turbine	5,253	21	49	70	2.3
Combined cycle	5,510	26	41	67	1.6
Reciprocating engine	3,345	26	42	69	1.6
All schemes	5,104	23	44	67	1.9

CHP schemes which export and schemes with mechanical power output

6.25 Table 6E shows the electrical exports from CHP schemes between 2006 and 2008. Where a scheme that exports is Good Quality for only a portion of its capacity and output, the exports have been scaled back in the same way as power output has been scaled back (see paragraph 6.10, above). Exports accounted for about 24 per cent of power generation from CHP in 2008. This is significantly below that of 2006 and earlier and is expected to be due to under reporting of exports in the part of schemes submitting to CHPQA, where reporting of exports remains voluntary.

Table 6E: Electrical exports from CHP

	2006	2007	2008
To part of same qualifying group (1)	1,064r	546r	571
To a firm NOT part of same qualifying group	3,074r	1,601r	1,552
To an electricity supplier	4,620r	4,692r	4,678
Total	8,758r	6,839r	6,801

(1) A qualifying group is a group of two or more corporate consumers that are connected or related to each other, for example, as a subsidiary, or via a parent or holding company, or in terms of share capital.

6.26 In 2008 24 large schemes also export heat, some larger schemes to more than one customer. As Table 6F shows, together they supplied 8,760 GWh of heat in 2008, an increase of around 30 per cent compared to 2007 (revised).

Table 6F: Heat exports from CHP

	2006	2007	2008
To part of same qualifying group (1)	2,566	2,125r	3,180
To a firm NOT part of same qualifying group	5,816r	4,556r	5,581
Total	8,381	6,681	8,760

(1) A qualifying group is a group of two or more corporate consumers that are connected or related to each other, for example, as a subsidiary, or via a parent or holding company, or in terms of share capital.

6.27 There are an estimated 12 schemes with mechanical power output. For those schemes, mechanical power accounts for around 6 per cent of their capacity (Table 6G). These schemes are predominantly on petro-chemicals or steel sites, using by-product fuels in boilers to drive steam turbines. The steam turbine is used to provide mechanical rather than electrical power, driving compressors, blowers or fans, rather than an alternator.

Table 6G: CHP schemes with mechanical power output in 2008

	Unit	
Number of schemes		12
Total Power Capacity of these schemes (CHP _{TPC})	MWe	3,725
Mechanical power capacity of these schemes	MWe	231

Emissions savings

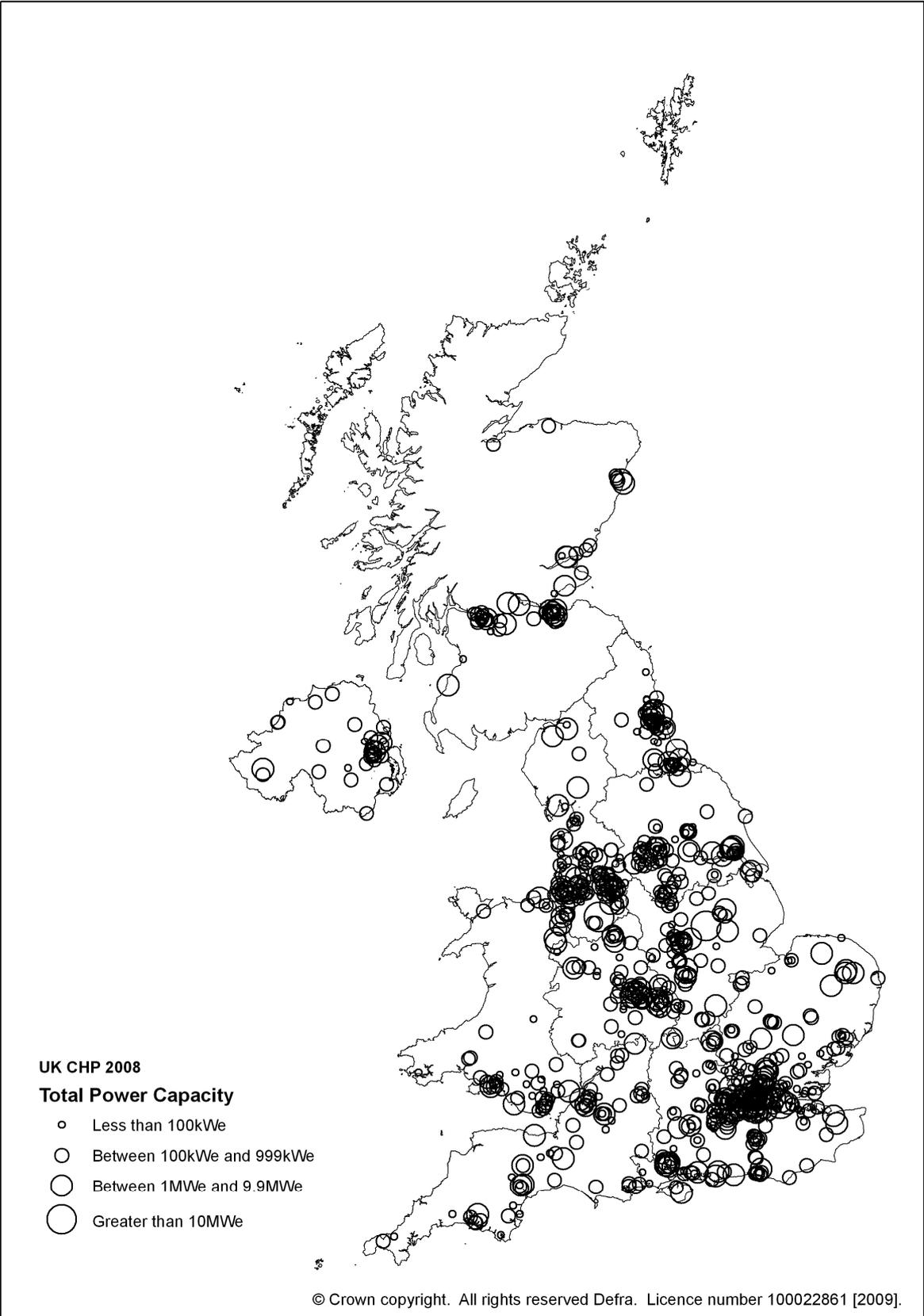
6.28 The calculation of carbon emissions savings from CHP is important, given the substantial contribution that CHP can make to the Climate Change Programme. However the derivation of the savings is complex because CHP displaces a variety of fuels, technologies and sizes of plant. The methodology and assumptions used for calculating carbon emission savings are outlined in Energy Trends June 2003 (www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx) and the figures compare CHP with the UK fossil fuel basket carbon intensity and the UK total basket carbon intensity which includes nuclear and renewable generation. The carbon emission savings from CHP in 2008 as compared to the fossil fuel basket were 14.35 MtCO₂, which equates to 2.62 Mt CO₂ per 1,000 MWe installed capacity. Against the total basket, in 2008 CHP saved 10.85 Mt CO₂, or 1.98 Mt CO₂ per 1,000 MWe installed capacity. Corresponding figures for 2006 and 2007 are shown in Table 6H. It is worthy of note that from 2006 to 2008 the trend in carbon intensity of conventionally generated electricity for both the full mix and for fossil fuel only has been down, which will reduce CO₂ savings attributable to CHP, all other things being equal.

Table 6H: Carbon dioxide savings due to CHP, absolute and per 1,000 MWe of installed good quality CHP capacity

	2006		2007		2008	
	MtCO ₂	MtCO ₂ /1000 MWe	MtCO ₂	MtCO ₂ /1000 MWe	MtCO ₂	MtCO ₂ /1000 MWe
Carbon savings against all fossil fuels	16.82	3.09	14.76	2.71	14.35	2.62
Carbon savings against all fuels (including nuclear and renewables)	11.60	2.13	10.76	1.97	10.85	1.98

Note: The CO₂ savings in Table 6H assume that CHP generated electricity avoids the transmission and distribution losses associated with its conventionally generated equivalent. These losses are assumed to be 1.5% in the case of transmission losses and 6.0% in the case of distribution losses. Previous editions of the Digest did not allow for this.

CHP schemes in the United Kingdom by power capacity, 2008



Technical notes and definitions

6.29 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1, paragraphs 1.26 to 1.58.

Data for 2008

6.30 The data are summarised from the results of a long-term project undertaken by AEA on behalf of the Department of Energy & Climate Change (DECC). Data are included for CHP schemes installed in all sectors of the UK economy.

6.31 The project continues to be overseen by a Steering Group that comprises officials from DECC, the Office of Gas and Electricity Markets (Ofgem), the Combined Heat and Power Association (CHPA) and the Office for National Statistics (ONS) all of whom have an interest in either the collection of information on CHP schemes or the promotion of the wider use of CHP in the UK.

6.32 Data for 2008 were based largely on data supplied to the CHPQA programme, by information from the Iron and Steel Statistics Bureau (ISSB) and from Ofgem "Renewables Obligation Certificates" (ROCs) information. Over 94 per cent of the total capacity is from schemes certified under the CHPQA programme, while about 1.2 per cent is from schemes covered by ISSB sources. Data for schemes not applying for CHPQA and not available from other sources were interpolated from historical data. These schemes account for about 3 per cent of total capacity. Since 2005, Sewage Treatment Works that do not provide returns to CHPQA in a format that can be used within these statistics, have been included based on ROCs information from Ofgem returns. The sewage treatment works data from this source account for approximately 1.4 per cent of total electrical capacity.

Definitions of schemes

6.33 There are four principal types of CHP system:

- **Steam turbine**, where steam at high pressure is generated in a boiler. In **back pressure steam turbine systems**, the steam is wholly or partly used in a turbine before being exhausted from the turbine at the required pressure for the site. In **pass-out condensing steam turbine systems**, a proportion of the steam used by the turbine is extracted at an intermediate pressure from the turbine with the remainder being fully condensed before it is exhausted at the exit. (Condensing steam turbines without passout and which do not utilise steam are not included in these statistics as they are not CHP). The boilers used in such schemes can burn a wide variety of fuels including coal, gas, oil, and waste-derived fuels. With the exception of waste-fired schemes, a steam turbine plant has often been in service for several decades. Steam turbine schemes capable of supplying useful steam have electrical efficiencies of between 10 and 20 per cent, depending on size, and thus between 70 per cent and 30 per cent of the fuel input is available as useful heat. Steam turbines used in CHP applications typically range in size from a few MWe to over 100 MWe.
- **Gas turbine systems**, often aero-engine derivatives, where fuel (gas, or gas-oil) is combusted in the gas turbine and the exhaust gases are normally used in a waste heat boiler to produce usable steam, though the exhaust gases may be used directly in some process applications. Gas turbines range from 30 kWe upwards, achieving electrical efficiency of 23 to 30 per cent (depending on size) and with the potential to recover up to 50 per cent of the fuel input as useful heat. They have been common in CHP since the mid 1980s. The waste heat boiler can include supplementary or auxiliary firing using a wide range of fuels, and thus the heat to power ratio of the scheme can vary.
- **Combined cycle systems**, where the plant comprises more than one prime mover. These are usually gas turbines where the exhaust gases are utilised in a steam generator, the steam from which is passed wholly or in part into one or more steam turbines. In rare cases reciprocating engines may be linked with steam turbines. Combined cycle is suited to larger installations of 7 MWe and over. They achieve higher electrical efficiency and a lower heat to power ratio than steam turbines or gas turbines. Recently installed combined cycle gas turbine (CCGT) schemes have achieved an electrical efficiency approaching 50 per cent, with 20 per cent heat recovery, and a heat to power ratio of less than 1:1.

- **Reciprocating engine systems** range from less than 100 kWe up to around 5 MWe, and are found in applications where production of hot water (rather than steam) is the main requirement, for example, on smaller industrial sites as well as in buildings. They are based on auto engine or marine engine derivatives converted to run on gas. Both compression ignition and spark ignition firing is used. Reciprocating engines operate at around 28 to 33 per cent electrical efficiency with around 50 per cent to 33 per cent of the fuel input available as useful heat. Reciprocating engines produce two grades of waste heat: high grade heat from the engine exhaust and low grade heat from the engine cooling circuits.

Determining fuel consumption for heat and electricity

6.34 In order to provide a comprehensive picture of electricity generation in the United Kingdom and the fuels used to generate that electricity, the energy input to CHP schemes has to be allocated between heat and electricity production. This allocation is notional and is not determinate.

6.35 The convention used to allocate the fuels to heat and electricity relates the split of fuels to the relative efficiency of heat and electricity supply. The efficiency of utility plant varies widely: electricity generation from as little as 25 per cent to more than 50 per cent and boilers from 50 per cent to more than 90 per cent. Thus it is around twice as hard to generate a unit of electricity as it is to generate a unit of heat. Accordingly a simple convention can be implemented whereby twice as many units of fuel are allocated to each unit of electricity generated, as to each unit of heat supplied. This approach is consistent with the Defra Guidelines for Company Reporting on greenhouse gas emissions and for Negotiated Agreements on energy efficiency agreed between Government and industry as part of the Climate Change Levy (CCL) package. It recognises that, in developing a CHP scheme, both the heat customer(s) and the electricity generator share in the savings, reflecting the fact that more than three-quarters of CHP build in the last few years has been supplied under an energy services arrangement.

6.36 The assumption in this convention that it is twice as hard to generate a unit of electricity as heat, is appropriate for the majority of CHP schemes. However, for some types of scheme (for example in the iron and steel sector) this allocation is less appropriate and can result in very high apparent heat efficiencies. These, however, are only notional efficiencies.

The effects on the statistics of using CHPQA

6.37 Paragraph 6.10 described how schemes were scaled back so that only CHP_{QPC} and CHP_{QPO} are included in the CHP statistics presented in this Chapter. This is illustrated in Table 6K. In 2008, 173 schemes have been scaled back. In 2007, 185 (revised) schemes were also scaled back.

6.38 In 2008, the power output from these schemes was scaled back from a total of 32,343 GWh to 8,612 GWh. The total fuel input to these schemes was 93,594 GWh of which 56,035 GWh was regarded as being for power only.

Table 6K: CHP capacity, output and fuel use which has been scaled back in 2008

	Units	
Number of schemes requiring scaling back		173
Total Power Capacity of these schemes (CHP_{TPC})	MWe	5,367
Qualifying Power Capacity of these schemes (CHP_{QPC})	MWe	1,750
Total power output of these schemes (CHP_{TPO})	GWh	32,343*
Qualifying Power Output of these schemes (CHP_{QPO})	GWh	8,612
Electricity regarded as "Power only" not from CHP ($CHP_{TPO} - CHP_{QPO}$)	GWh	23,731
Total Fuel Input of these schemes (CHP_{TFI})	GWh	93,594
Fuel input regarded as being for "Power only" use i.e. not for CHP	GWh	56,035

*This figure includes generation from major power producers

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6.1 CHP installations by capacity and size range

	2004	2005	2006	2007	2008
Number of schemes (1)	1,340r	1,372r	1,378r	1,435r	1,439
Less than 100 kWe	482r	467r	467r	463r	462
100 kWe to 999 kWe	602r	642r	653r	699r	707
1 MWe to 9.9 MWe	183	188r	187r	203r	200
10.0 MWe and above	73	75	71r	70r	70
					MWe
Total capacity	5,397r	5,534r	5,434r	5,450r	5,469
Less than 100 kWe	30r	29r	29r	29r	29
100 kWe to 999 kWe	153r	166	167r	182r	185
1 MWe to 9.9 MWe	732	731r	705r	742r	723
10.0 MWe and above	4,481	4,607	4,532r	4,497r	4,532

(1) A site may contain more than one CHP scheme.

6.2 Fuel used to generate electricity and heat in CHP installations

	2004	2005	2006	2007	2008
					GWh
Fuel used to generate electricity (1)					
Coal (2)	1,696	1,559	1,797	1,750r	1,726
Fuel oil	1,888	1,617	1,552r	892r	896
Natural gas	44,152r	47,509r	46,874r	46,519r	46,016
Renewable fuels (3)	1,264r	1,414r	1,783r	1,742r	2,179
Other fuels (4)	9,267	10,411	10,801	10,300r	10,191
Total all fuels	58,267r	62,510r	62,806r	61,204r	61,009
Fuel used to generate heat					
Coal (2)	2,816	2,591	2,559	2,369r	2,227
Fuel oil	2,763	2,150	2,006	1,248r	1,184
Natural gas	40,703r	41,147r	39,276r	38,524r	38,756
Renewable fuels (3)	1,420r	1,434r	1,400r	1,477r	2,237
Other fuels (4)	14,220	14,784	14,323	13,842r	13,708
Total all fuels	61,922r	62,106r	59,565r	57,460r	58,112
Overall fuel use					
Coal (2)	4,512	4,150	4,356	4,120r	3,953
Fuel oil	4,651	3,767	3,558r	2,140r	2,080
Natural gas	84,856r	88,656r	86,150r	85,042r	84,772
Renewable fuels (3)	2,683r	2,848r	3,183r	3,219r	4,416
Other fuels (4)	23,487	25,196	25,124	24,142r	23,899
Total all fuels	120,188r	124,616r	122,371r	118,664r	119,121

(1) See paragraphs 6.34 to 6.36 for an explanation of the method used to allocate fuel use between heat generation and electricity generation.

(2) Includes coke and semi-coke.

(3) Renewable fuels include: sewage gas; other biogases; municipal waste and refuse derived fuels.

(4) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.

6.3 Fuel used by types of CHP installation

GWh

	2004	2005	2006	2007	2008
Coal					
Back pressure steam turbine	942	903	693	592	521
Gas turbine	50	44	-	43	29
Combined cycle	118	41	589	568r	568
Reciprocating engine	-	-	-	-	8
Pass out condensing steam turbine	3,402	3,162	3,074	2,916r	2,826
Total coal	4,512	4,150	4,356	4,120r	3,953
Fuel oil					
Back pressure steam turbine	473	463	207	138	140
Gas turbine	8	8	12	3	3
Combined cycle	3,756	2,953	2,994	1,629r	1,487
Reciprocating engine	182	162	140r	139r	153
Pass out condensing steam turbine	232	182	206	232	297
Total fuel oil	4,651	3,767	3,558r	2,140r	2,080
Natural gas					
Back pressure steam turbine	3,092	2,938	2,154	1,855r	1,714
Gas turbine	13,580	12,358	11,462	11,763r	12,721
Combined cycle	58,959	65,112	64,979r	63,719r	62,596
Reciprocating engine	7,819r	6,995r	6,426r	6,739r	6,715
Pass out condensing steam turbine	1,407	1,254	1,128	966r	1,026
Total natural gas	84,856r	88,656r	86,150r	85,042r	84,772
Renewable fuels (1)					
Back pressure steam turbine	416	326	535	525r	1,521
Gas turbine	21	30	26	10r	-
Combined cycle	411	634	654	611r	612
Reciprocating engine	1,381r	1,484r	1,317r	1,462r	1,550
Pass out condensing steam turbine	453	374	651	611r	733
Total renewable fuels	2,683r	2,848r	3,183r	3,219r	4,416
Other fuels (2)					
Back pressure steam turbine	5,356	5,930	5,829	5,090r	5,089
Gas turbine	4,002	4,040	4,125	4,024r	3,722
Combined cycle	10,510	11,436	10,516	10,837r	11,287
Reciprocating engine	76	58	57	51r	40
Pass out condensing steam turbine	3,542	3,731	4,597	4,141r	3,761
Total other fuels	23,487	25,196	25,124	24,142r	23,899
Total - all fuels					
Back pressure steam turbine	10,279	10,559	9,418	8,199r	8,986
Gas turbine	17,662	16,480	15,625	15,843r	16,475
Combined cycle	73,753	80,176	79,733r	77,363r	76,550
Reciprocating engine	9,458r	8,699r	7,940r	8,391r	8,467
Pass out condensing steam turbine	9,036	8,702	9,655	8,867r	8,643
Total all fuels	120,188r	124,616r	122,371r	118,664r	119,121

(1) Renewable fuels include: sewage gas, other biogases, municipal solid waste and refuse derived fuels.

(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.

6.4 CHP - electricity generated by fuel and type of installation

	GWh				
	2004	2005	2006	2007	2008
Coal					
Back pressure steam turbine	106	99	77	63	57
Gas turbine	8	7	-	7	5
Combined cycle	15	3	136	120r	120
Reciprocating engine	-	-	-	-	1
Pass out condensing steam turbine	570	541	517	514r	509
Total coal	699	650	730	704r	692
Fuel oil					
Back pressure steam turbine	53	53	25	16	16
Gas turbine	2	2	3	1	1
Combined cycle	776	636	618	316r	306
Reciprocating engine	59	50	47	47r	51
Pass out condensing steam turbine	34	29	34	36	44
Total fuel oil	923	769	727	417r	416
Natural gas					
Back pressure steam turbine	255	235	172	142	121
Gas turbine	2,939	2,697	2,464	2,701r	2,906
Combined cycle	15,305	17,381	17,600r	16,952r	16,639
Reciprocating engine	1,948r	1,780r	1,621r	1,693r	1,687
Pass out condensing steam turbine	170	155	135	144r	146
Total natural gas	20,618r	22,248r	21,992r	21,632r	21,499
Renewable fuels (1)					
Back pressure steam turbine	51	36	70	71r	215
Gas turbine	4	5	4	1r	-
Combined cycle	25	43	60	21r	22
Reciprocating engine	376r	416r	387r	445r	475
Pass out condensing steam turbine	37	34	109	115r	127
Total renewable fuels	493r	534r	631r	653r	838
Other fuels (2)					
Back pressure steam turbine	657	684	641	593r	628
Gas turbine	621	642r	571	608r	538
Combined cycle	2,516	2,975	2,860	2,800r	2,907
Reciprocating engine	19	12	14	12r	10
Pass out condensing steam turbine	309	316	573	432	383
Total other fuels	4,121	4,631	4,659	4,445r	4,465
Total - all fuels					
Back pressure steam turbine	1,122	1,107	987	884r	1,037
Gas turbine	3,574	3,354	3,041	3,318r	3,449
Combined cycle	18,637	21,037	21,274r	20,209r	19,993
Reciprocating engine	2,402r	2,258r	2,069r	2,198r	2,224
Pass out condensing steam turbine	1,120	1,075	1,367	1,241r	1,208
Total all fuels	26,855r	28,831r	28,738r	27,851r	27,911

(1) Renewable fuels include: sewage gas, other biogases, municipal solid waste and refuse derived fuels.

(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.

6.5 CHP - electrical capacity by fuel and type of installation

	MWe				
	2004	2005	2006	2007	2008
Coal					
Back pressure steam turbine	32	32	26	28	20
Gas turbine	1	1	-	1	1
Combined cycle	3	0	18	20r	20
Reciprocating engine	-	-	-	-	1
Pass out condensing steam turbine	161	159	150	145r	142
Total coal	197	193	195	194r	184
Fuel oil					
Back pressure steam turbine	15	14	9	7	7
Gas turbine	0	0	0	0	0
Combined cycle	132	116	131	68r	60
Reciprocating engine	21	16	16	16r	16
Pass out condensing steam turbine	9	8	8	10r	12
Total fuel oil	176	154	165	102r	95
Natural gas					
Back pressure steam turbine	74	74	61	47r	37
Gas turbine	550	494	479	511r	542
Combined cycle	2,777	3,045	3,015r	3,029r	3,005
Reciprocating engine	508	507	498r	525r	521
Pass out condensing steam turbine	55	61	43	39r	40
Total natural gas	3,964	4,180r	4,097r	4,152r	4,143
Renewable fuels (1)					
Back pressure steam turbine	13	12	16	16	37
Gas turbine	1	1	1	0r	-
Combined cycle	6	6	10	8r	8
Reciprocating engine	92	100r	100r	116r	123
Pass out condensing steam turbine	10	10	23	23	23
Total renewable fuels	121r	129r	149r	163r	191
Other fuels (2)					
Back pressure steam turbine	136	137	112	109r	109
Gas turbine	113	111	113	119r	114
Combined cycle	596	522	494	509r	535
Reciprocating engine	5	4	4	4	4
Pass out condensing steam turbine	89	103	105	99r	93
Total other fuels	939	877	828	840r	855
Total - all fuels					
Back pressure steam turbine	270	270	225	207r	210
Gas turbine	665	607	593	632r	657
Combined cycle	3,514	3,688	3,668r	3,635r	3,628
Reciprocating engine	625r	627r	618r	661r	665
Pass out condensing steam turbine	323	342	330	315r	309
Total all fuels	5,397r	5,534r	5,434r	5,450r	5,469

(1) Renewable fuels include: sewage gas, other biogases, municipal solid waste and refuse derived fuels.

(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.

6.6 CHP - heat generated by fuel and type of installation

	GWh				
	2004	2005	2006	2007	2008
Coal					
Back pressure steam turbine	749	713	504	442	373
Gas turbine	28	24	-	24	19
Combined cycle	58	7	170	155r	155
Reciprocating engine	-	-	-	-	4
Pass out condensing steam turbine	1,593	1,526	1,503	1,380r	1,312
Total coal	2,428	2,270	2,177	2,002r	1,863
Fuel oil					
Back pressure steam turbine	347	336	181	122	117
Gas turbine	4	4	5	2r	2
Combined cycle	2,168	1,560	1,568	901r	792
Reciprocating engine	56	55	43	44r	50
Pass out condensing steam turbine	114	85	90	101	131
Total fuel oil	2,690	2,040	1,886r	1,169r	1,091
Natural gas					
Back pressure steam turbine	2,356	2,271	1,672	1,444r	1,305
Gas turbine	6,756	6,143	5,648	5,679r	6,258
Combined cycle	24,779	26,435	25,976r	25,396r	25,268
Reciprocating engine	3,436r	3,085r	2,849r	2,949r	2,956
Pass out condensing steam turbine	860	696	611	507r	527
Total natural gas	38,186r	38,629r	36,757r	35,975r	36,313
Renewable fuels (1)					
Back pressure steam turbine	157	144	242	176r	755
Gas turbine	11	16	14	5r	-
Combined cycle	83	108	107	85r	85
Reciprocating engine	553r	554r	444r	518r	560
Pass out condensing steam turbine	174	146	143	141r	166
Total renewable fuels	978r	968r	949r	924r	1,566
Other fuels (2)					
Back pressure steam turbine	3,285	3,558	3,314	2,911r	3,079
Gas turbine	2,004	1,973	1,962	1,891r	1,729
Combined cycle	4,937	4,841	4,209	4,562r	4,857
Reciprocating engine	33	24	23	22r	18
Pass out condensing steam turbine	1,984	2,145	2,141	1,867r	1,681
Total other fuels	12,242	12,541	11,649	11,253r	11,363
Total - all fuels					
Back pressure steam turbine	6,894	7,022	5,912	5,094r	5,628
Gas turbine	8,803	8,160	7,630	7,601r	8,007
Combined cycle	32,024	32,950	32,030r	31,100r	31,157
Reciprocating engine	4,078r	3,717r	3,358r	3,533r	3,588
Pass out condensing steam turbine	4,726	4,598	4,488	3,995r	3,817
Total all fuels	56,524r	56,448r	53,418r	51,323r	52,197

(1) Renewable fuels include: sewage gas, other biogases, municipal solid waste and refuse derived fuels.

(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.

6.7 CHP - heat capacity by fuel and type of installation

	MWth				
	2004	2005	2006	2007	2008
Coal					
Back pressure steam turbine	196	200	152	160	127
Gas turbine	4	4	-	3	4
Combined cycle	10	1	14	16r	16
Reciprocating engine	-	-	-	-	1
Pass out condensing steam turbine	445	445	453	424r	412
Total coal	656	649	619	604r	559
Fuel oil					
Back pressure steam turbine	95	94	51	42	39
Gas turbine	1	1	1	0	0
Combined cycle	292	247	275	119r	103
Reciprocating engine	21	17	18	18r	18
Pass out condensing steam turbine	29	23	23	28	36
Total fuel oil	437	382	367r	207	195
Natural gas					
Back pressure steam turbine	459	457	364	348r	289
Gas turbine	1,717	1,496	1,424	1,421r	1,410
Combined cycle	4,067	4,267	4,252r	4,431r	4,393
Reciprocating engine	761	691	670r	665r	655
Pass out condensing steam turbine	226	183	176r	159r	162
Total natural gas	7,229r	7,092r	6,886r	7,023r	6,909
Renewable fuels (1)					
Back pressure steam turbine	46	44	47	45r	45
Gas turbine	2	2	2	2	-
Combined cycle	13	16	17	16r	16
Reciprocating engine	122r	114r	113r	111r	111
Pass out condensing steam turbine	43	43	43	43	43
Total renewable fuels	226r	220r	222r	218r	216
Other fuels (2)					
Back pressure steam turbine	435	437	397	380r	380
Gas turbine	1,512	1,517	1,586	1,572r	1,535
Combined cycle	897	813	746	740r	795
Reciprocating engine	7	5	4	4	4
Pass out condensing steam turbine	375	385	383	342r	329
Total other fuels	3,225	3,157	3,116	3,039r	3,044
Total - all fuels					
Back pressure steam turbine	1,231	1,231	1,011	975r	879
Gas turbine	3,236	3,020	3,013	2,998r	2,949
Combined cycle	5,278	5,343	5,304r	5,323r	5,323
Reciprocating engine	910r	827r	804r	798r	789
Pass out condensing steam turbine	1,119	1,079	1,079	996r	983
Total all fuels	11,773r	11,500r	11,211r	11,091r	10,924

(1) Renewable fuels include: sewage gas, other biogases, municipal solid waste and refuse derived fuels.

(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.

6.8 CHP capacity, output and total fuel use⁽¹⁾ by sector

	Unit	2004	2005	2006	2007	2008
Iron and steel and non ferrous metals						
Number of sites		7	7	7	8r	8
Electrical capacity	MWe	67	67	81	80r	78
Heat capacity	MWth	285	285	285	285	285
Electrical output	GWh	243	238	520	367r	351
Heat output	GWh	1,708	1,765	1,812	1,718r	1,593
Fuel use	GWh	3,244	3,045	3,984	3,812r	3,596
of which : for electricity	GWh	662	609	1,426	1,096r	1,026
for heat	GWh	2,582	2,436	2,558	2,716r	2,570
Chemicals						
Number of sites		51r	52r	50r	50r	48
Electrical capacity	MWe	1,789r	1,862r	1,819r	1,798r	1,822
Heat capacity	MWth	4,057r	3,994r	3,920r	3,837r	3,798
Electrical output	GWh	10,080r	9,832r	10,082r	9,398r	9,542
Heat output	GWh	18,359r	18,282r	18,311r	17,111r	17,612
Fuel use	GWh	42,888r	42,650r	43,041r	40,522r	41,198
of which : for electricity	GWh	22,612r	22,193r	22,548r	21,343r	21,584
for heat	GWh	20,276r	20,457r	20,492r	19,178r	19,613
Oil and gas terminals and oil refineries						
Number of sites		8	9	9	9	9
Electrical capacity	MWe	1,672	1,735	1,731	1,765r	1,763
Heat capacity	MWth	3,677	3,677	3,677	3,677	3,677
Electrical output	GWh	7,211	9,957	10,040	9,940r	9,823
Heat output	GWh	17,065	17,803	16,779	16,894r	17,244
Fuel use	GWh	33,809	40,713	40,426	40,068r	39,760
of which : for electricity	GWh	15,513	21,306	21,679	21,429r	20,974
for heat	GWh	18,296	19,407	18,747	18,639r	18,786
Paper, publishing and printing						
Number of sites		32r	30r	26r	26r	26
Electrical capacity	MWe	669r	655r	619r	535r	555
Heat capacity	MWth	1,381r	1,350r	1,217r	1,182r	1,169
Electrical output	GWh	4,217r	3,840r	3,394r	3,062r	3,149
Heat output	GWh	8,300r	7,977r	6,770r	6,137r	6,456
Fuel use	GWh	17,229r	16,116r	14,028r	12,865r	13,364
of which : for electricity	GWh	8,555r	7,795r	6,927r	6,388r	6,527
for heat	GWh	8,674r	8,321r	7,100r	6,477r	6,837
Food, beverages and tobacco						
Number of sites		41	42	40	40	37
Electrical capacity	MWe	403	408	408	424r	404
Heat capacity	MWth	1,063	968	923	911r	814
Electrical output	GWh	2,026	2,091	1,952	2,102r	2,085
Heat output	GWh	5,242	5,148	4,576	4,216r	4,190
Fuel use	GWh	9,407	9,381	8,604	8,542r	8,441
of which : for electricity	GWh	4,105	4,223	3,945	4,254r	4,207
for heat	GWh	5,303	5,158	4,659	4,288r	4,235

For footnotes see page 177

6.8 CHP capacity, output and total fuel use⁽¹⁾ by sector (continued)

	Unit	2004	2005	2006	2007	2008
Metal products, machinery and equipment						
Number of sites		19	18	17	18r	18
Electrical capacity	MWe	80r	75r	37r	69r	69
Heat capacity	MWth	87r	57r	38	57r	57
Electrical output	GWh	228r	175r	146r	174r	200
Heat output	GWh	331r	221r	214r	211r	214
Fuel use	GWh	958r	686r	633r	609r	634
of which : for electricity	GWh	527r	407r	346r	370r	398
for heat	GWh	431r	279r	286r	239r	236
Mineral products, extraction, mining and agglomeration of solid fuels						
Number of sites		10r	10r	9	9r	8
Electrical capacity	MWe	72r	57	53r	54r	50
Heat capacity	MWth	216r	216r	215r	215r	205
Electrical output	GWh	282r	223r	175r	182r	125
Heat output	GWh	914r	902r	746r	714r	531
Fuel use	GWh	1,612r	1,500r	1,235r	1,188r	966
of which : for electricity	GWh	629r	498r	382r	403r	317
for heat	GWh	984r	1,001r	854r	785r	649
Sewage treatment						
Number of sites		109r	124r	124r	160r	171
Electrical capacity	MWe	118r	125r	129r	146r	153
Heat capacity	MWth	149r	138r	138r	138r	138
Electrical output	GWh	436r	466r	447r	502r	571
Heat output	GWh	630r	615r	519r	589r	701
Fuel use	GWh	1,593r	1,662r	1,548r	1,676r	2,014
of which : for electricity	GWh	925r	999r	983r	1,056r	1,236
for heat	GWh	668r	663r	565r	620r	778
Other industrial branches (2)						
Number of sites		6r	7r	7r	7r	7
Electrical capacity	MWe	43r	44r	44r	41r	41
Heat capacity	MWth	74r	74r	74r	74r	74
Electrical output	GWh	292r	196r	236r	259r	246
Heat output	GWh	436r	330r	392r	387r	347
Fuel use	GWh	982r	712r	866r	936r	882
of which : for electricity	GWh	567r	390r	481r	545r	526
for heat	GWh	415r	322r	385r	390r	356
Total industry						
Number of sites		283r	299r	289r	327r	332
Electrical capacity	MWe	4,912r	5,041r	4,921r	4,911	4,935
Heat capacity	MWth	10,989r	10,759r	10,487r	10,376r	10,217
Electrical output	GWh	25,016r	27,019r	26,994r	25,986r	26,091
Heat output	GWh	52,985r	r	50,118r	47,977r	48,888
Fuel use	GWh	111,723r	116,465r	114,365r	110,217r	110,855
of which : for electricity	GWh	54,095r	58,419r	58,718r	56,884r	56,795
for heat	GWh	57,629r	58,047r	55,647r	53,333r	54,060

For footnotes see page 177

6.8 CHP capacity, output and total fuel use⁽¹⁾ by sector (continued)

	Unit	2004	2005	2006	2007	2008
Transport, commerce and administration						
Number of sites		591r	599r	600r	611r	607
Electrical capacity	MWe	250r	261r	263r	284r	278
Heat capacity	MWth	438r	418r	411r	406r	398
Electrical output	GWh	1,074r	1,051r	976r	1,103r	1,091
Heat output	GWh	2,051r	2,024r	2,083r	2,128r	2,106
Fuel use	GWh	4,548r	4,459r	4,389r	4,719r	4,623
of which : for electricity	GWh	2,309r	2,264r	2,091r	2,386r	2,342
for heat	GWh	2,240r	2,195r	2,297r	2,333r	2,281
Other (3)						
Number of sites		466r	474r	489r	497r	500
Electrical capacity	MWe	234r	232r	249r	256r	256
Heat capacity	MWth	346r	323r	312r	309r	309
Electrical output	GWh	765r	761r	768r	762r	729
Heat output	GWh	1,489r	1,381r	1,216r	1,217r	1,202
Fuel use	GWh	3,917r	3,692r	3,618r	3,728r	3,643
of which : for electricity	GWh	1,863r	1,827r	1,997r	1,934r	1,871
for heat	GWh	2,054r	1,864r	1,620r	1,794r	1,771
Total CHP usage by all sectors						
Number of sites		1,340r	1,372r	1,378r	1,435r	1,439
Electrical capacity	MWe	5,397r	5,534r	5,434r	5,450r	5,469
Heat capacity	MWth	11,773r	11,500r	11,211r	11,091r	10,924
Electrical output	GWh	26,855r	28,831r	28,738r	27,851r	27,911
Heat output	GWh	56,524r	56,448r	53,418r	51,323r	52,197
Fuel use	GWh	120,188r	124,616r	122,371r	118,664r	119,121
of which : for electricity	GWh	58,267r	62,510r	62,806r	61,204r	61,009
for heat	GWh	61,922r	62,106r	59,565r	57,460r	58,112

(1) The allocation of fuel use between electricity and heat is largely notional and the methodology is outlined in paragraphs 6.34 to 6.36.

(2) Other industry includes Textiles, clothing and footwear sector.

(3) Sectors included under Other are agriculture, community heating, leisure, landfill and incineration.

6.9 CHP - use of fuels by sector

	GWh				
	2004	2005	2006	2007	2008
Iron and steel and non ferrous metals					
Fuel oil	102	55	79	105	170
Natural gas	282	202	181	195r	315
Blast furnace gas	2,523	2,313	3,083	2,885	2,490
Coke oven gas	337	475	641	628	621
Total iron and steel and non ferrous metals	3,244	3,045	3,984	3,812r	3,596
Chemicals					
Coal	2,923	2,804	3,395	3,372r	3,383
Fuel oil	185	145	292	153r	152
Gas oil	409	545	98	28r	22
Natural gas	35,442r	34,987r	35,330r	33,359r	34,041
Refinery gas	1,132	1,132	1,181	1,181	1,181
Renewable fuels (2)	21	30	26	10r	-
Other fuels (1)	2,776	3,006	2,719	2,420r	2,419
Total chemical industry	42,888r	42,650r	43,041r	40,522r	41,198
Oil and gas terminals and oil refineries					
Fuel oil	3,716	2,910	2,844	1,606	1,466
Gas oil	94	111	80	122r	120
Natural gas	15,042r	20,818	21,041	22,045r	21,618
Refinery gas	4,444	4,011	4,651	5,583r	5,895
Other fuels (1)	10,512	12,863	11,810	10,711r	10,661
Total oil refineries	33,809	40,713	40,426	40,068r	39,760
Paper, publishing and printing					
Coal	635r	683	595	437r	347
Fuel oil	266	308	3	0	12
Gas oil	30	73	188	22r	18
Natural gas	16,167r	14,905r	13,092r	12,255r	11,846
Renewable fuels (2)	1	0	-	-	1,032
Other fuels (1)	130	147	150	151	108
Total paper, publishing and printing	17,229r	16,116r	14,028r	12,865r	13,364
Food, beverages and tobacco					
Coal	577	578	338	238	156
Fuel oil	191	192	199	137	127
Gas oil	767	97	81	59r	22
Natural gas	7,850	8,473	7,965	8,100r	8,124
Renewable fuels (2)	-	-	1	2r	7
Other fuels (1)	23	42	20	5	5
Total food, beverages and tobacco	9,407	9,381	8,604	8,542r	8,441
Metal products, machinery and equipment					
Fuel oil	92	89	89	89	89
Gas oil	0	0	0	0	0
Natural gas	734r	492r	439r	455r	481
Renewable fuels (2)	131	105	104	65r	65
Total metal products, machinery and equipment	958r	686r	633r	609r	634

For footnotes see page 179

6.9 CHP - use of fuels by sector (continued)

	GWh				
	2004	2005	2006	2007	2008
Mineral products, extraction, mining and agglomeration of solid fuels					
Gas oil	-	-	1	0	0
Natural gas	1,390r	1,231r	964r	919r	674
Coke oven gas	223	269	271	269r	291
Total mineral products, extraction, mining and agglomeration of solid fuels	1,612	1,500r	1,235r	1,188r	966
Sewage treatment					
Fuel oil	60	53	41	48r	63
Gas oil	30	15	20	23r	15
Natural gas	124	112	145	118r	240
Renewable fuels (2)	1,380r	1,483r	1,341r	1,487r	1,696
Total sewage treatment	1,593r	1,662r	1,548r	1,676r	2,014
Other industrial branches					
Gas oil	-	9r	1r	13r	3
Natural gas	982r	703r	866r	923r	880
Total other industrial branches	982r	712r	866r	936r	882
Transport, commerce and administration					
Coal	50	44	-	43	29
Fuel oil	29r	6r	1r	0r	0
Gas oil	17r	21r	116	32	15
Natural gas	4,451r	4,387r	4,109r	4,468r	4,448
Renewable fuels (2)	2	2	162r	176r	131
Total transport, commerce and administration	4,548r	4,459r	4,389r	4,719r	4,623
Other (3)					
Coal	326	41	28	29r	37
Fuel oil	9r	9r	10	1	1
Gas oil	39r	65r	14	12r	13
Natural gas	2,392r	2,347r	2,016r	2,206r	2,105
Renewable fuels (2)	1,149	1,228	1,548r	1,479r	1,485
Other fuels (1)	1r	1r	1r	1r	1
Total other	3,917r	3,692r	3,618r	3,728r	3,643
Total - all sectors					
Coal	4,512	4,150	4,356	4,120r	3,953
Fuel oil	4,651	3,767	3,558r	2,140r	2,080
Gas oil	1,385	934	599	309r	227
Natural gas	84,856r	88,656r	86,150r	85,042r	84,772
Blast furnace gas	2,523	2,313	3,083	2,885	2,490
Coke oven gas	559	744	911	897	912
Refinery gas	5,576	5,143	5,832	6,764r	7,076
Renewable fuels (2)	2,683r	2,848r	3,183r	3,219r	4,416
Other fuels (1)	13,443	16,060	14,699	13,287r	13,194
Total CHP fuel use	120,188r	124,616r	122,371r	118,664r	119,121

(1) Other fuels include: process by-products.

(2) Renewable fuels include: sewage gas, other biogases, municipal solid waste and refuse derived fuels.

(3) Sectors included under Other are agriculture, community heating, leisure, landfill and incineration.

Chapter 7

Renewable sources of energy

Introduction

7.1 This chapter provides information on the contribution of renewable energy sources to the United Kingdom's energy requirements. It includes sources that under international definitions are not counted as renewable sources or are counted only in part. This is to ensure that this Digest covers all sources of energy available in the United Kingdom. However, within this chapter the international definition of total renewables is used and this excludes non-biodegradable wastes. The energy uses of wastes are still shown in the tables of this chapter but as "below the line" items. This chapter covers the use of renewables to generate electricity, the burning of renewable fuels to produce heat either in boilers (or cookers) or in combined heat and power (CHP) plants, and the use of liquid biofuels for transport.

7.2 The data summarise the results of DECC surveys of electricity generators, information from CHP schemes, and an ongoing study undertaken by the AEA on behalf of the Department of Energy and Climate Change (DECC) to update a database containing information on all relevant renewable energy sources in the United Kingdom. This database is called RESTATS, the Renewable Energy STATisticS database.

7.3 The study started in 1989, when all relevant renewable energy sources were identified and, where possible, information was collected on the amounts of energy derived from each source. The renewable energy sources identified were the following: active solar heating; photovoltaics; onshore and offshore wind power; wave power; large and small scale hydro; biomass (both plant and animal based); geothermal aquifers. The technical notes at the end of this chapter define each of these renewable energy sources. The database now contains 20 years of data from 1989 to 2008.

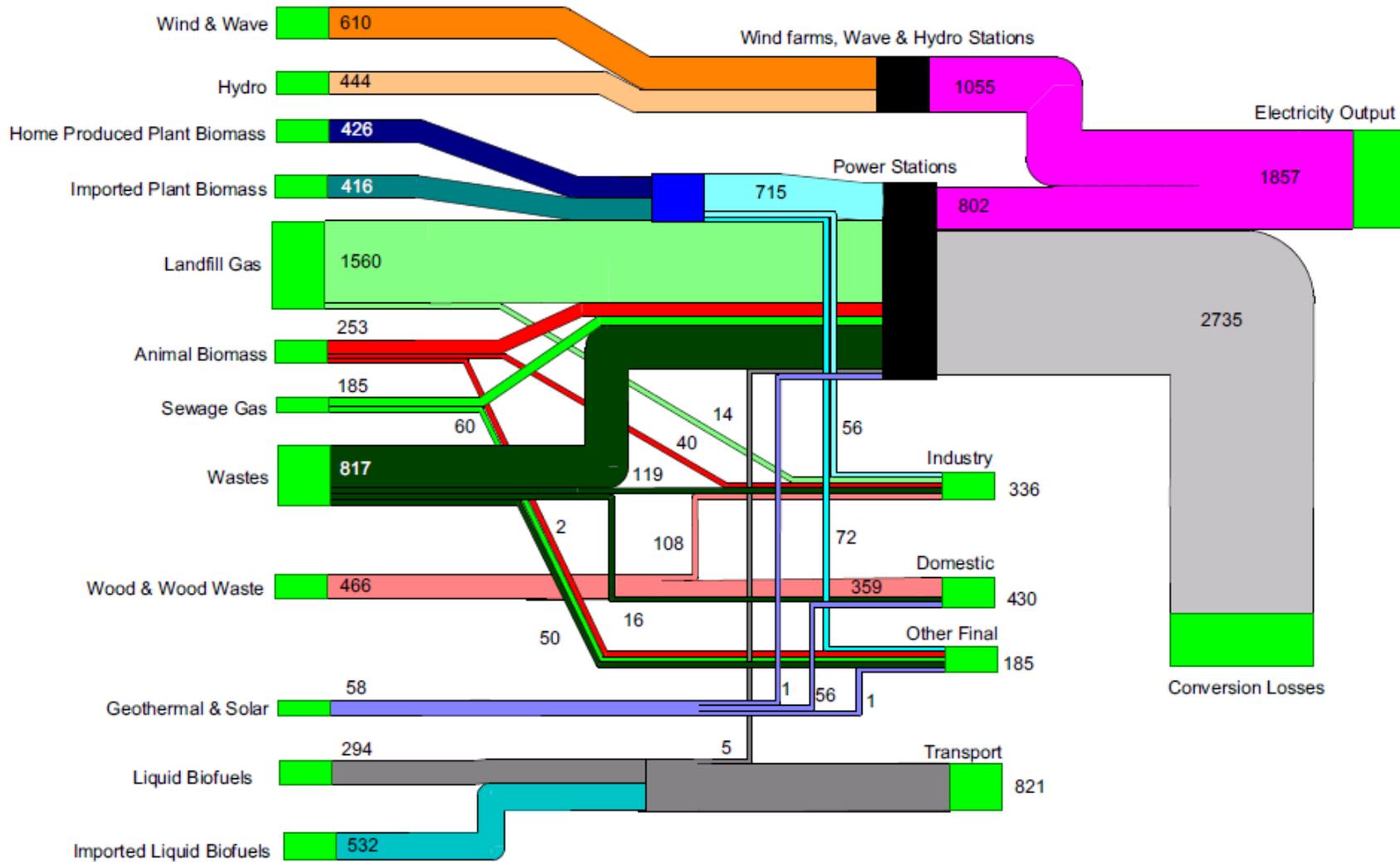
7.4 The information contained in the database is collected by a number of methods. For larger projects, an annual survey is carried out in which questionnaires are sent to project managers. For technologies in which there are large numbers of small projects, the values given in this chapter are estimates based on information collected from a sub-sample of the projects. Further details about the data collection methodologies used in RESTATS, including the quality and completeness of the information, are given in the technical notes at the end of this chapter.

7.5 An energy flow chart for 2008, showing the flows of renewables from fuel inputs through to consumption, is included overleaf. This is a way of simplifying the figures that can be found in the commodity balance for renewables energy sources in Table 7.1. It illustrates the flow of primary fuels from the point at which they become available from home production or imports (on the left) to their eventual final uses (on the right) as well as the energy lost in conversion.

7.6 Commodity balances for renewable energy sources covering each of the last three years form the first three tables (Tables 7.1 to 7.3). Unlike in the commodity balance tables in other chapters of the Digest, Tables 7.1 to 7.3 have zero statistical differences. This is because the data for each category of fuel are, in the main, taken from a single source where there is less likelihood of differences due to timing or measurement. These balance tables are followed by 5-year tables showing capacity of, and electricity generation from, renewable sources (Table 7.4), and generation from sources eligible for the Renewables Obligation (RO) (Table 7.5). Table 7.6 shows renewable sources used to generate electricity, to generate heat, and for transport purposes in each of the last five years. Table 7.7 has been introduced for the first time in this edition of the Digest to show progress against the new EU Renewables Directive target. A long-term trends commentary and table (Table 7.1.1) covering the use of renewables to generate electricity, to generate heat, and as a transport fuel is available on DECC's energy statistics web site and accessible from the Digest of UK Energy Statistics home page:

www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

Renewables flow chart 2008 (thousand tonnes of oil equivalent)



Note: This flow chart is based on data that appear in Tables 7.1 and 7.4

Also available on the web site is Table 7.1.2 summarising all the renewable orders made under the Non Fossil Fuels Obligation (NFFO), Northern Ireland Non Fossil Fuels Obligation, and Scottish Renewables Orders (SRO) along with descriptive text.

Renewables Obligation

7.7 In April 2002 the Renewables Obligation (RO) (and the analogous Renewables Obligation (Scotland)) came into effect¹. It is an obligation on all electricity suppliers to supply a specific proportion of electricity from eligible renewable sources. Eligible sources include all those covered by this chapter but with specific exclusions. These are: existing hydro plant of over 20 MW; all plant using renewable sources built before 1990 (unless re-furbished and less than 20 MW); and energy from mixed waste combustion unless the waste is first converted to fuel using advanced conversion technology. Only the biodegradable fraction of any waste is eligible (in line with the EU Directive, see paragraph 7.9, below). All stations outside the United Kingdom (the UK includes its territorial waters and the continental shelf) are also excluded. Table 7.5 shows all the components of total electricity generation on an RO basis. Strictly speaking until 2005, the RO covers only Great Britain, but in these UK based statistics Northern Ireland renewable sources have been treated as if they were also part of the RO.

7.8 Prior to 2002 the main instruments for pursuing the development of renewables capacity were the NFFO Orders for England and Wales and for Northern Ireland, and the Scottish Renewable Orders. In this chapter the term “NFFO Orders” is used to refer to these instruments collectively. For projects contracted under NFFO Orders in England and Wales, the Non Fossil Purchasing Agency (NFPA) provided details of capacity and generation. The Scottish Executive and Northern Ireland Electricity provided information on the Scottish and Northern Ireland NFFO Orders, respectively. Statistics of these Orders can now be found on the DECC energy web site (see paragraph 7.6, above).

Renewables Directives

7.9 The European Union’s Renewables Directive (RD) came into force in October 2001. It proposed that Member States adopt national targets for renewables that were consistent with reaching the overall EU target of 12 per cent of energy (22.1 per cent of electricity) from renewables by 2010. The UK “share” of this target was that renewables sources eligible under the RD should account for 10 per cent of UK electricity **consumption** by 2010. In March 2007 the European Council agreed to a common strategy for energy security and tackling climate change. An element of this was establishing a target of 20 per cent of EU's energy to come from renewable sources. During 2008 a new Renewables Directive was negotiated on this basis and resulted in agreement of country “shares” of this target. For the UK, the share is that by 2020 15 per cent of **final energy consumption** - calculated on a net calorific basis, and with a cap on fuel used for air transport - should be accounted for by energy from renewable sources (see paragraph 7.31, below). The Government published a new UK Renewable Energy Strategy earlier this summer, setting out how we will meet the 15 per cent target.

Renewables Policy

7.10 Since February 2000, the United Kingdom’s renewables policy has consisted of four key strands:

- an RO on all electricity suppliers in Great Britain to supply a specific proportion of electricity from eligible renewables, introduced in April 2002;
- exemption of electricity from renewable sources² from the Climate Change Levy, introduced from April 2001;
- an expanded support programme for new and renewable energy including capital grants and an expanded research and development programme; and
- development of a regional strategic approach to planning and targets for renewables.

The RO is part of the UK’s programme to tackle climate change and to encourage a more sustainable approach to energy consumption. Previous policy has been successful in introducing renewables to the UK marketplace and in reducing costs. The focus of current policy is to build on these

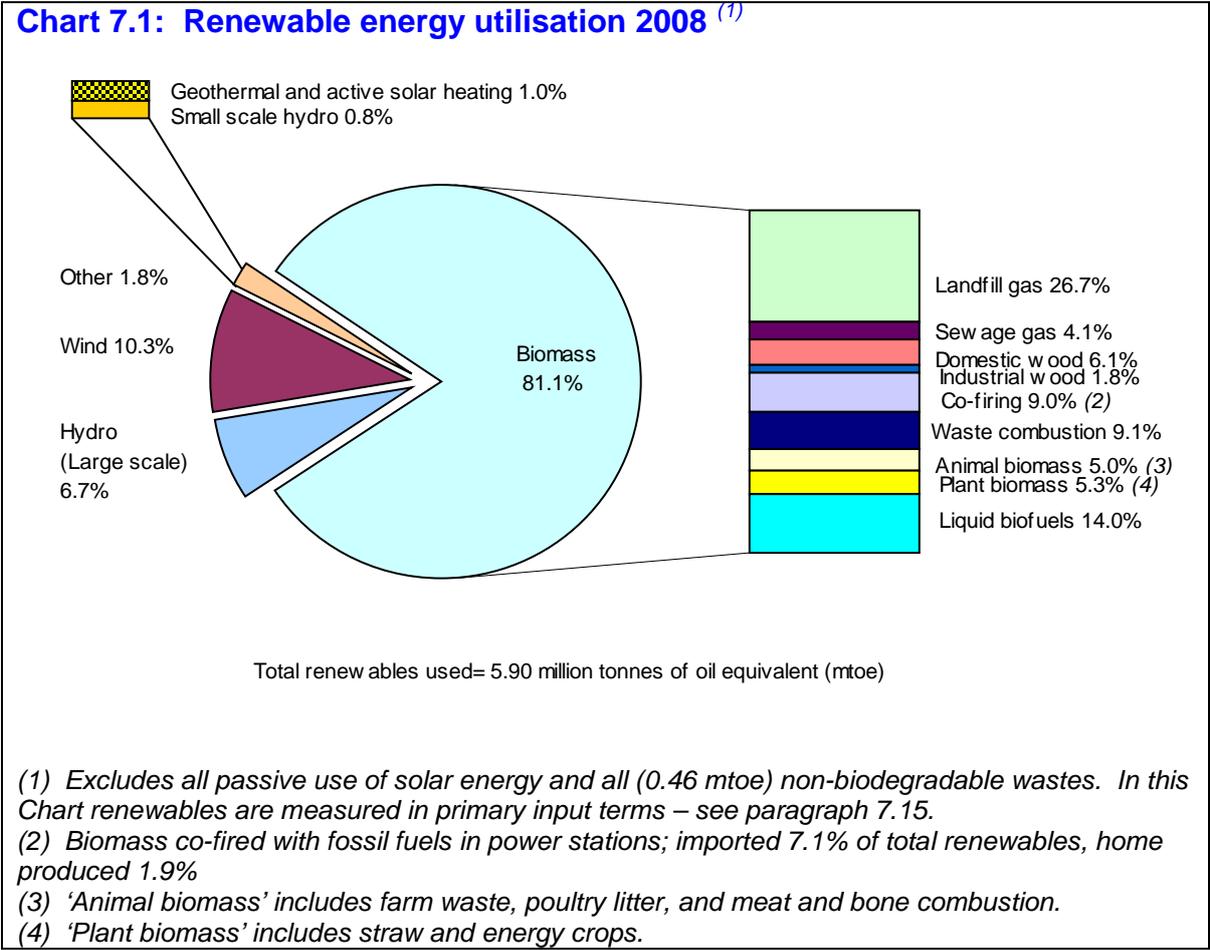
¹ Parliamentary approval of the Renewables Obligation Orders under The Utilities Act 2000 was given in March 2002.

² Electricity generated by hydro stations with a declared net capacity of more than 10 MW is not exempt from the Climate Change Levy.

achievements through the Obligation and a system of capital grants designed to bring forward offshore wind and energy crops, thereby maximising the chances of meeting the Government’s targets.

Commodity balances for renewables in 2008 (Table 7.1), 2007 (Table 7.2) and 2006 (Table 7.3)

7.11 Eleven different categories of renewable fuels are identified in the commodity balances. Some of these categories are themselves groups of renewables because a more detailed disaggregation could disclose data for individual companies. In the commodity balance tables the distinction between biodegradable and non-biodegradable wastes cannot be maintained for this reason. The largest contribution to renewables in **input** terms (81 per cent) is from biomass, with wind generation and large-scale hydro electricity production contributing the majority of the remainder as Chart 7.1 shows. Only 2 per cent of renewable energy comes from renewable sources other than biomass, wind and large-scale hydro. These include solar, small-scale hydro and geothermal aquifers.



7.12 Nearly three-quarters (73 per cent) of the renewable energy (excluding non-biodegradable wastes) produced in 2008 was transformed into electricity. This is a decrease from 79 per cent in 2007 and 83 per cent in 2006, because the use of biofuels for transport has grown at a faster rate than the use of renewables for electricity generation. While biomass appears to dominate the picture when fuel inputs are being measured, hydro electricity and wind power together provide a larger contribution when the output of electricity is being measured as Table 7.4 shows. This is because on an energy supplied basis the inputs are deemed to be equal to the electricity produced for hydro, wind, wave and solar (see Chapter 5, paragraph 5.28). However for landfill gas, sewage sludge, municipal solid waste and other renewables a substantial proportion of the energy content of the input is lost in the process of conversion to electricity as the flow chart (page 182, illustrates).

Capacity of, and electricity generated from, renewable sources (Table 7.4)

7.13 Table 7.4 shows the capacity of, and the amounts of electricity generated from, each renewable source. Total electricity generation from renewables in 2008 amounted to 21,597 GWh, an increase of 1,952 GWh (+10 per cent) on 2007. The main contributors to this substantial increase were 1,301 GWh from onshore wind (+29 per cent), 523 GWh (+67 per cent) from offshore wind, 159 GWh from plant biomass (+39 per cent), 80 GWh (+2 per cent) from landfill gas, 69 GWh from sewage sludge digestion (+14 per cent), 48 GWh (+4 per cent) from municipal solid waste combustion, and 46 GWh from large scale hydro (+1 per cent). However there was a 343 GWh decrease in co-firing of biomass with fossil fuels (-18 per cent). Generation from wind (both onshore and offshore) was the largest renewables technology in output terms in 2008, with 33 per cent of the electricity generated from renewables being from wind, 24 per cent was from hydro sources, 22 per cent from landfill gas, 7 per cent from co-firing, and 14 per cent from other biofuels.

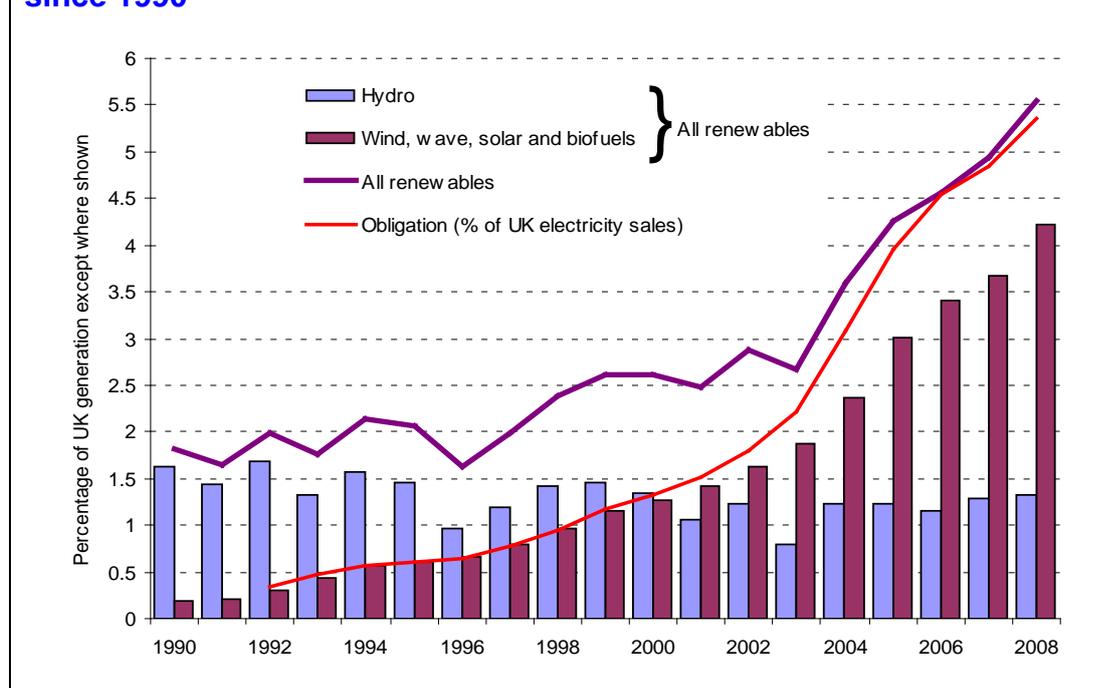
7.14 As a result, all renewable sources provided 5.5 per cent of the electricity generated in the United Kingdom in 2008, 0.6 percentage points higher than in 2007. Table 7A and Chart 7.2 show the growth in the proportion of electricity produced from renewable sources. They include the progress towards the renewables target set under the RO (see paragraph 7.7 above and paragraph 7.21, below).

Table 7A: Percentages of electricity derived from renewable sources

	2006	2007	2008
Overall renewables percentage (international basis)	4.6	4.9	5.5
Percentage on a Renewables Obligation basis	4.5	4.8	5.4

7.15 In 2008 renewable generation measured using the RO basis increased to 5.4 per cent of electricity sales by licensed suppliers. This figure has been slightly revised since issued in the June 2009 edition of Energy Trends; the change between the two estimates is 0.02 percentage points, but this is sufficient to change the rounded figure from 5.3 to 5.4 per cent. The increases in the percentages shown in Table 7A are mainly due to growth in the numerators (ie the renewables element). However the 1.8 per cent reduction in the electricity generation denominator (for the international basis) and a 0.2 per cent increase in the electricity sales by licensed suppliers (for the RO basis), which is smaller than the renewable increase, have helped increase the percentages. Since the introduction of the RO in 2002 generation from wind has increased on average by one third each year.

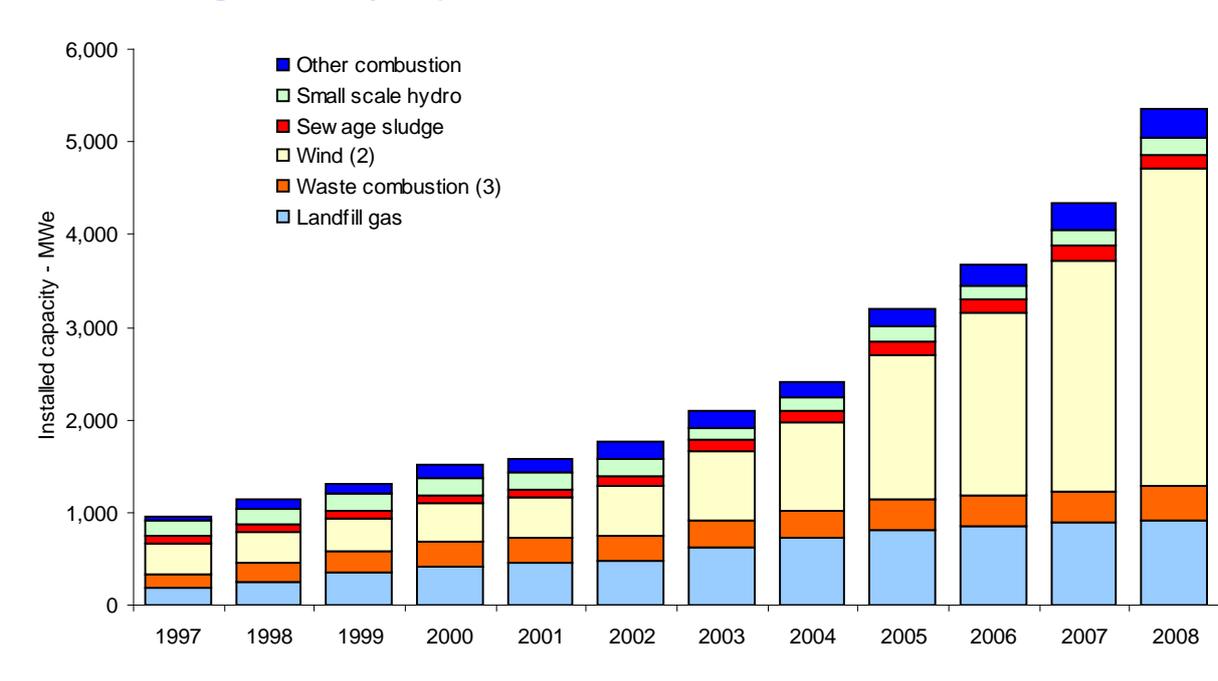
Chart 7.2: Growth in electricity generation from renewable sources since 1990



7.16 There was a 1,102 MWe increase (+19 per cent) in the installed generating capacity of renewable sources in 2008, mainly as a result of a 737 MWe increase (+35 per cent) in onshore wind capacity and a 192 MWe increase (+49 per cent) in offshore wind capacity. There was also a 98 MWe increase (+7 per cent) in the capacity using large scale hydro, and a 49 MWe increase (+15 per cent) in capacity fuelled by waste combustion.

7.17 Chart 7.3 (which covers all renewables capacity except large scale hydro) illustrates the continuing increase in the electricity generation capacity from all significant renewable sources. This upward trend in the capacity of renewable sources will continue as recently consented onshore and offshore windfarms and other projects come on stream. A map, shown on page 190 shows the location of wind farms in operation at the end of December 2008, together with an indication of the capacity.

Chart 7.3: Electrical generating capacity of renewable energy plant (excluding large-scale hydro)⁽¹⁾



(1) Large scale hydro capacity was 1,456 MWe in 2008.
 (2) Wind includes both onshore and offshore and also includes solar photovoltaics (22.5 MWe in 2008) and shoreline wave (0.5 MWe in 2008).
 (3) All waste combustion plant is included because both biodegradable and non-biodegradable wastes are burned together in the same plant.

7.18 In 2008, (excluding large-scale hydro which largely pre-date the introduction of NFFO) one-quarter of electricity from renewables was generated under NFFO contracts. Table 7.4, however, includes both electricity generated outside of these contracts and electricity from large-scale hydro schemes, and thus reports on total electricity generation from renewables. All electricity generated from renewables is also reported within the tables of Chapter 5 of this Digest (eg Table 5.6).

7.19 Plant load factors in Table 7.4 have been calculated in terms of installed capacity and express the average hourly quantity of electricity generated as a percentage of the average capacity at the beginning and end of the year. In the past the overall figure has been heavily influenced by the availability of hydro capacity during the year, which in turn has been influenced by the amount of rainfall during the preceding period. For instance, the dry weather in 2006 resulted in a reduced hydro load factor. Plant load factors for all generating plant in the UK are shown in Chapter 5, Table 5.10.

7.20 To overcome the biasing of load factors for wind caused by new turbines coming on stream either early or late in a calendar year, Table 7.4 also contains a second statistic to describe the load factor of wind turbines. This statistic is calculated in the same way as the other load factors but

includes only those wind farms that have operated throughout the calendar year with an unchanged configuration. See paragraphs 7.75 and 7.76 for the full definitions. In 2008, this “unchanged configuration” load factor for both onshore and offshore wind farms are slightly higher than the all-onshore and all-offshore factors because new capacity came on stream in the latter half of the year, and also because in some months some other new turbines had generation lower than their potential. On the unchanged basis, the load factor for onshore and offshore both increased in 2008, for offshore by nearly one quarter.

Electricity generated from renewable sources: Renewables Obligation basis (Table 7.5)

7.21 Electricity generated in the UK from renewable sources eligible under the RO in 2008 was 11 per cent greater than in 2007. This compares with growth of 6 per cent and 14 per cent in both 2007 and 2006 respectively. Chart 7.2 shows the growth in the proportion of electricity produced from renewable sources under the Renewables Obligation and international definitions. Table 7A shows electricity eligible under the RO as a percentage of electricity sales. RO eligible generation has tripled since its introduction in 2002. This compares with an all-renewable electricity generation figure that has nearly doubled over the same period, from a higher starting level.

Renewable sources used to generate electricity and heat (Table 7.6)

7.22 Between 2007 and 2008 there was an increase of 5.1 per cent in the **input** of renewable sources into electricity generation. Wind grew by 35 per cent, hydro by 1.6 per cent; biomass use increased by 1.4 per cent.

7.23 Table 7.6 also shows the contribution from renewables to heat generation. Around 13½ per cent of renewable sources were used to generate heat in 2008. Renewables used to generate heat declined to a low point in 2001 but since picked up to be less than 3 per cent lower in 2008 than the level 10 years earlier. The decline was mainly due to tighter emissions controls discouraging on-site burning of biomass, especially wood waste by industry. Domestic use of wood accounts for 45 per cent of all renewables used for heat. Plant biomass overtook the industrial use of wood and wood waste in 2008 to become, at 16 per cent, the second largest component. In addition, the use of active solar heating has more than doubled in the last five years.

Liquid Biofuels

7.24 AEA has further researched the UK production and consumption of liquid biofuels in 2008 and combined this with the information they had previously obtained for 2007 and 2006.

7.25 Around 320 million litres of biodiesel were produced in the UK in 2008, around two-thirds the amount produced in 2007 (485 million litres) but higher than in 2006. Biodiesel consumption figures can be obtained from figures published by HM Revenue and Customs (HMRC) derived from road fuel taxation statistics. The most usual way for biodiesel to be sold is for it to be blended with ultra-low sulphur diesel fuel; further information on this is given in Chapter 3 (see page 61). However, it is estimated that around 1 per cent was used in 2008 to generate electricity. The duty payable on biodiesel is 20 pence per litre less than the duty payable on road diesel; in blended fuels the duty payable is proportionate to the duty payable on the constituent fuels. The HMRC figures show that 886 million litres of biodiesel were consumed in 2008, up from 347 million litres in 2007, 169 million litres in 2006 and 33 million litres in 2005. Around 572 million litres of biodiesel were imported in 2007. The total annual capacity for biodiesel production in the UK was estimated to reach 540 million litres per year in 2010 if all the planned plant become operational and the existing plant operate at full capacity. This production level would be equivalent to around 2.2 per cent of the UK’s diesel consumption in 2008. This reduced capacity, compared to that reported as planned in last year’s Digest, is due to adverse market conditions, in particular the uncertainty surrounding the Renewable Transport Fuels Obligation (see paragraph 7.28 for more information) and possible sustainability requirements, with a number of significant producers going out of business in 2008 and other plant operating at reduced output. Plans for additional capacity have largely been cancelled or postponed, so that the best estimate of capacity in 2010 is probably the current capacity of about 540 million litres per year.

7.26 HMRC data show that 206 million litres of bioethanol was consumed in the UK in 2008; this continues a trend of increasing bioethanol use that started with 85 million litres in 2005. Only one UK

plant was in production in 2008, and so the majority of the bioethanol was imported. If all planned plants became operational on current planned timescales, their combined capacity would be around 505 million litres by 2011, equivalent to 2.2 per cent of the UK's petrol consumption in 2008, rising to a possible 1,660 million litres after 2012. Some of the capacity reported as planned in last year's Digest will not now go ahead, reportedly due to the uncertain future market.

7.27 The HMRC data have been converted from litres to tonnes of oil equivalent and the data are now shown in both the commodity balances (Tables 7.1 to 7.3) and in Table 7.6. In addition these data are also included in the aggregate energy balances (Tables 1.1 to 1.3). The tables show the increasing contribution that liquid biofuels are making towards total renewable sourced energy. In 2008, 14 per cent of the renewable sources used in the UK in primary input terms were liquid biofuels for transport, up from 7 per cent in 2007, 4 per cent in 2006 and less than half a per cent in 2003.

7.28 A further source of statistical information on liquid biofuels is from the Renewable Fuels Agency (RFA). The RFA were set up to implement the Renewable Transport Fuel Obligation (RTFO), which came into force on 15 April 2008. The RFA administers the monthly reporting process required of fuel companies under the RTFO, issuing Renewable Transport Fuel certificates in proportion to the quantity of biofuels registered. Since the RTFO did not begin until April 2008, calendar year data were not available this year from that source. However AEA are working closely with the RFA and DECC hope to use this data in future years.

Renewable sources data used to indicate progress under the EU Renewables Directive 2008 (Table 7.7)

7.29 An article published in the March 2008 Energy Trends (see Annex C for further information about Energy Trends) compared current and proposed target levels of the share of renewable energy in total final energy consumption in each of the 27 EU Member States. Total final energy consumption in that article has now been termed Gross Final Energy Consumption by Eurostat. It includes the use of electricity and heat (and other fuels used for heating) by final consumers, and the use of energy for transport purposes. Gross final energy consumption (which is calculated on a net calorific value basis) also currently includes consumption of electricity by electricity generators, consumption of heat by heat generators, transmission and distribution losses for electricity, and transmission and distribution losses for distributed heat. Additionally, the Directive now includes a cap on the proportion that air transport can contribute to the total; this cap is currently 6.18 per cent. In the UK, energy balances are usually published on a gross calorific value basis, but in order to facilitate comparisons with EU statistics the balances for 2004 to 2008 have been calculated on a net calorific value basis and are available at: www.decc.gov.uk/en/content/cms/statistics/source/total/total.aspx

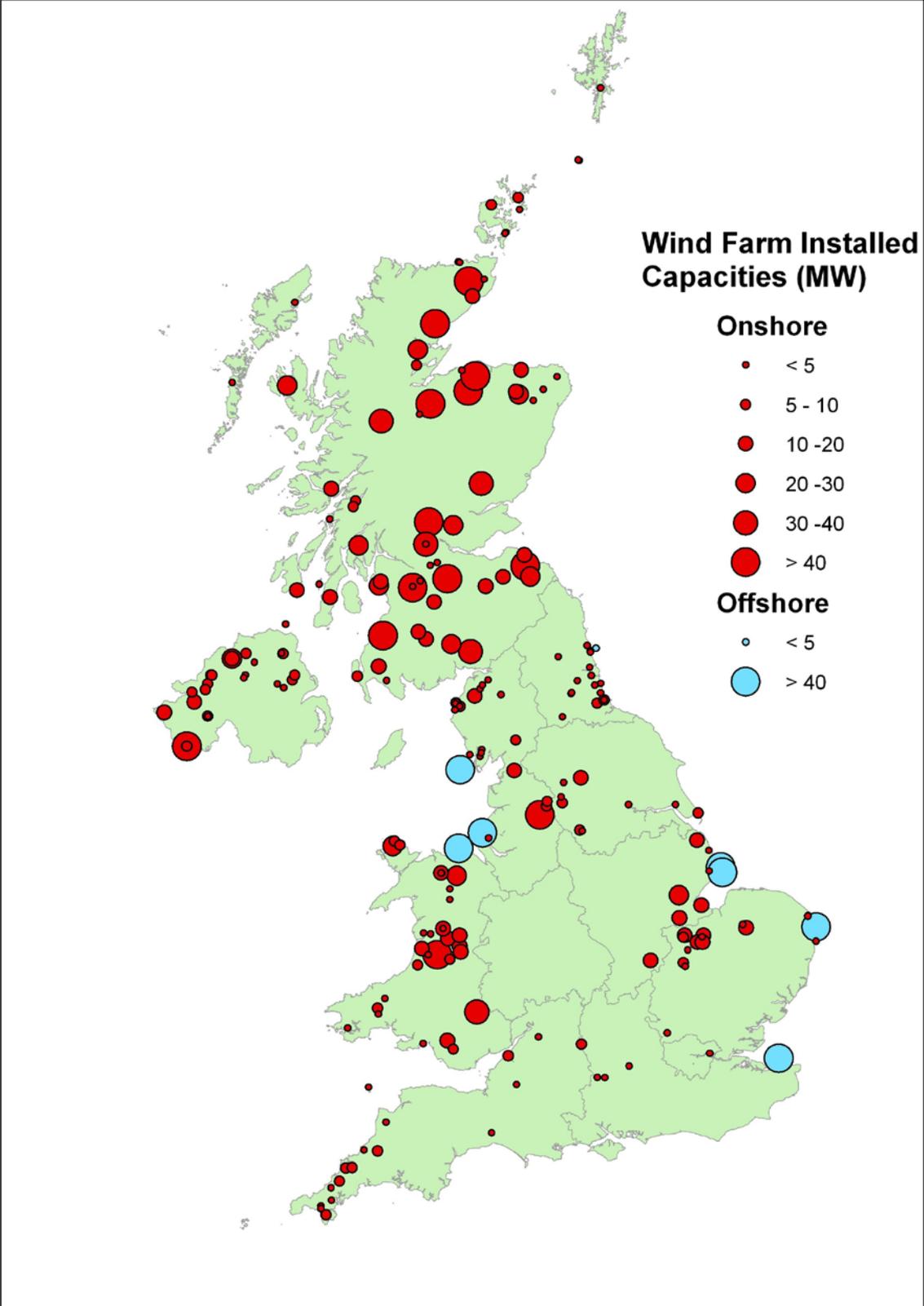
7.30 Table 7.7 is a new table that brings together the relevant renewable energy and final energy consumption data to show progress towards the target of 15 per cent of UK energy consumption to be sourced from renewables by 2020.

	2006	2007	2008
Percentage of capped gross final energy consumption (ie the basis proposed by Eurostat for the new Renewables Directive)	1.6	1.8	2.3
Percentage of primary energy demand (ie the basis previously quoted in this Digest)	1.8	2.0	2.4

7.31 Table 7B shows that overall, renewable sources, excluding non-biodegradable wastes and passive solar design (see paragraph 7.35), continues to increase and provided 2.4 per cent of the United Kingdom's total primary energy requirements in 2008. On the basis proposed in the Renewables Directive, the UK percentage rose by 0.5 percentage points in 2008 to 2.3 per cent. The primary energy demand basis produces higher percentages because thermal renewables are measured including the energy that is lost in transformation. The thermal renewables used in the UK are less efficient in transformation than fossil fuels and as non-thermal renewables such as wind (which by convention are 100 per cent efficient in transformation) grow as a proportion of UK renewables use, the gross final energy consumption percentage will overtake the primary energy demand percentage.

7.32 A proportion of the electricity imported into the United Kingdom is certified as being exempt from the Climate Change Levy (CCL) because it has been produced from renewable sources. The UK cannot count this electricity as contributing towards its EU renewables target because its origin is other EU Member States and it is already being counted in their own electricity generation figures. It is estimated by the Office of the Gas and Electricity Markets (Ofgem) that imports of electricity counted as CCL exempt amounted to 4,223 GWh in 2006, 2,173 GWh in 2007, and 7,589 GWh in 2008.

The Location of Wind Farms in the United Kingdom, as at 31 December 2008.



Technical notes and definitions

7.33 Energy derived from renewable sources is included in the aggregate energy tables in Chapter 1 of this Digest. The main commodity balance tables (Tables 7.1 to 7.3) present figures in the common unit of energy, the tonne of oil equivalent, which is defined in Chapter 1 paragraph 1.26. The gross calorific values and conversion factors used to convert the data from original units are given on page 223 of Annex A and inside the back cover flap. The statistical methodologies and conversion factors are in line with those used by the International Energy Agency and the Statistical Office of the European Communities (Eurostat). Primary electricity contributions from hydro and wind are expressed in terms of an electricity supplied model (see Chapter 5, paragraph 5.28). Electrical capacities in this chapter are quoted as Installed capacities. However, in Chapter 5, Declared Net Capacity (DNC) or Transmission Entry Capacity of renewables are used when calculating the overall UK generating capacity. These measures take into account the intermittent nature of the power output from some renewable sources (see paragraph 7.74, below).

7.34 The various renewable energy sources are described in the following paragraphs. This section also provides details of the quality of information provided within each renewables area, and the progress made to improve the quality of this information. While the data in the printed and bound copy of this Digest cover only the most recent five years, these notes also cover data for earlier years that are available on the DECC energy web site.

Use of existing solar energy

7.35 Nearly all buildings make use of some passive solar energy because they have windows or roof lights, which allow in natural light and provide a view of the surroundings. This existing use of passive solar energy is making a substantial contribution to the energy demand in the UK building stock. Passive solar design (PSD), in which buildings are designed to enhance solar energy use, results in additional savings in energy. The installed capacity of PSD in the UK and other countries can only be estimated and is dependent on how the resource is defined. The unplanned benefit of solar energy for heating and lighting in UK buildings is estimated to be 145 TWh/year. The figure is very approximate and, as in previous years, has therefore not been included in the tables in this chapter. Only a few thousand buildings have been deliberately designed to exploit solar energy – a very small proportion of the total UK building stock. It has been estimated that the benefit of deploying PSD in these buildings is equivalent to a saving of about 10 GWh/year.

Active solar heating

7.36 Active solar heating employs solar collectors to heat water mainly for domestic hot water systems but also for swimming pools and other applications. Updated figures have been obtained by AEA (on behalf of DECC). For 2008, an estimated 104 GWh for domestic hot water generation replaces gas and electricity heating; for swimming pools, an estimated 379 GWh generation replaces gas (45 per cent), oil (45 per cent) or electricity (10 per cent).

Photovoltaics

7.37 Photovoltaics (PV) is the direct conversion of solar radiation into direct current electricity by the interaction of light with the electrons in a semiconductor device or cell. There have been significant increases in capacity and generation of PV in recent years due to increased support from the Government. The Major Photovoltaic Demonstration Programme that offered grants for small, medium and large-scale installations encouraged a significant number of new projects. Grants for photovoltaic installations, along with other microgeneration technologies, are now provided by the DECC Low Carbon Buildings Programme (LCBP), which was launched on 1st April 2006. The programme is operated in two phases; Phase 1 provides grants for private households whilst Phase 2 is open to applications for public-sector buildings and charitable bodies. Phase 1 of the programme has been extended to April 2011 while the funding allocation for PV installations under Phase 2 has now been fully committed. The installed capacity increased from 10.9 MW in 2005 to 14.3 MW in 2006, 18.1 MW in 2007 and to 22.5 MW in 2008.

Onshore wind power

7.38 A wind turbine extracts energy from the wind by means of a rotor fitted with aerodynamic-section blades using the lifting forces on the blades to turn the rotor primary shaft. This mechanical power is used to drive an electrical generator. The figures included for generation from wind turbines

are based on actual metered exports from the turbines and, where these data are unavailable, are based on estimates using regional load factors (see paragraphs 7.76 and 7.77 regarding load factors) and the wind farm installed capacity. Small-scale wind systems are turbines rated up to 50 kW, which can be sub divided into two categories, micro-wind turbines and small-wind turbines. Micro-wind turbines are classified as units with a capacity from 0 - < 1.5 kW, whereas small-wind turbines have a capacity of 1.5 kW – 50 kW. A recent study undertaken by AEA on behalf of DECC into the size of the market in the UK, also considered turbines with a power rating of 50 kW - 100 kW as small-scale systems in order to address gaps in reporting for this category. In terms of operational characteristics, siting considerations and the value and nature of the market, small-scale wind systems vary markedly from large-scale units. They can be off-grid or on-grid, mobile or fixed, free-standing or building-mounted, and can form part of combined installations, most commonly with photovoltaic systems. As a result, they have a greater range of applications compared to large-scale wind turbines and can be sited on board boats, in commercial, public and domestic settings or as single or multiple installations providing power to communities. It is estimated there are over 14,000 small-scale wind turbine installations up to 100 kW in the UK, with an installed generating capacity of around 26 MW. Approximately 80 per cent of all small-scale turbine units are micro-wind turbines that provide 9 MW of generating capacity. Electricity generated from small-scale wind has been estimated to be in the region of 16 GWh per year.

7.39 There are 451 large-scale wind farms or separately registered wind projects in the RESTATS database. Of these projects, 73 are under a current NFFO contract totalling 510 MW. There are an additional 28 ex-NFFO schemes accounting for a further 156 MW, of which 25 (154 MW) are now claiming ROCs. NFFO and ex-NFFO schemes account for 23.6 per cent of the UK installed capacity. A further 2124.6 MW of wind power (213 schemes) claim ROCs with the remainder not receiving any form of subsidy. Wind power installations in the UK continue at pace with 737 MW of onshore turbines coming onstream in 2008.

Offshore wind power

7.40 The UK's offshore wind resource is vast, with the potential to provide more than the UK's current demand for electricity. Offshore wind speeds are higher than those onshore (typically up to 0.5 m/s higher 10 km offshore) and also less turbulent. However, elevated inland sites can have higher wind speeds.

7.41 Due to the higher costs of installing each turbine offshore the machines tend to be larger than their onshore counterparts (2 MW and above). This is driven by economics, with larger machine more cost effective per unit of electricity generated. The larger turbines also experience higher wind speeds, because taller towers put the rotors into the stronger winds. In addition, onshore constraints such as planning, noise effects and visual impact are likely to be reduced offshore. As of December 2007 there were eight operational offshore wind farms totalling 586 MW. These were Blyth WTG1, North Hoyle, Scroby Sands, Kentish Flats, Barrow, Burbo Bank, Inner Dowsing and Lynn. In addition Beatrice (10 MW) provided electricity to the neighbouring offshore oil platform and its capacity and generation are not included in the UK figures.

Wave and Tidal Stream Power

7.42 Waves in the oceans are created by the interaction of winds with the surface of the sea. Because of the direction of the prevailing winds and the size of the Atlantic Ocean, the United Kingdom has wave power levels amongst the highest in the world. Under DECC's R&D programme a 75 kW experimental prototype an oscillating water column device came on line in late 1991 on the Hebridean island of Islay and was decommissioned in 1999. This was followed by another concrete shoreline Oscillating Water Column (OWC) device, the Limpet, also on Islay. Limpet has a nameplate capacity of 500 kW and was expected to produce an annual average output of approximately 200 kW. In fact it has only produced approximately one tenth of this because the seabed profile in front of the machine was shallower than expected. Over the past decade, a number of wave energy concepts have been developed in the UK, most notably the Pelamis - an articulated tube with sections linked by hinged joints - being developed since 1998 by Edinburgh-based Pelamis Wave Power (PWP, formerly Ocean Power Delivery). A full-scale prototype has undergone a number of sea trials including over 200 hours of grid-connected operation in 2004 and 2007. A 2.25 MW Pelamis farm consisting of three 750 kW machines is currently in the process of being commissioned in Portugal. On 24 September 2008 PWP announced that this "went live". No further announcements, however, regarding its progress have been made since then. In September 2008, American wave developer Ocean Power

Technologies (OPT) announced that it had deployed its 40 kW nameplate capacity PB40ES PowerBuoy off the coast of Santoña, northern Spain. Several wave energy generation projects are being planned for the near future, including:

- Scottish Power's proposed Pelamis farm at the European Marine Energy Centre (EMEC) on Orkney
- Npower Renewables' and Wavegen's OWC breakwater at Siadar Bay on the isle of Lewis
- The South West Regional Development Agency's (SWRDA) proposed Wave Hub off the north coast of Cornwall. This will host four independent farms developed by Orecon, Ocean Power Technologies, Fred Olsen and WestWave, a consortium of E.On and Ocean Prospect Limited, using the Pelamis technology of Pelamis Wave Power Ltd. In November 2008 SWRDA appointed subsea and pipeline engineering company J P Kenny as its engineering and management contractor following the abandonment of an earlier tender for a turnkey contractor that did not offer "sufficient value for money". SWRDA now predicts "installation in Spring 2010".
- On 29 September 2008 the Crown Estate announced that it is to offer commercial sea bed lease options in the Pentland Firth and surrounding area for marine energy devices. The competition closure on 15 May 2009 and The Crown Estate has announced that it has received 42 applications from 20 bidders for wave and tidal energy leases from 10 MW to 200-300 MW facilities. The identity of the bidders and details of their proposed projects have not yet been released.

7.43 Tidal currents are created by the movement of the tides, often magnified by local topographical features such as headlands, inlets to inland lakes, and straits. Tidal current energy is the extraction of energy from this flow, analogous to the way a wind turbine operates in air. A recent study estimated that the available UK resource is up to 22 TWh per year. Since 2000, DECC's Technology Programme has supported the development of a number of device concepts. To date, two device concepts have had full-scale prototypes deployed at sea. The first is the Seaflow machine installed by Bristol-based Marine Current Turbines Ltd (MCT) near Lynmouth in June 2003. This is in the process of being decommissioned but was not grid-connected and only operates during specific tests. The other device was the Stingray, which uses an oscillating hydrofoil instead of a rotating turbine, developed by Northumberland-based The Engineering Business Ltd (EB). The 180 tonne device was installed in Yell Sound, Shetland, in September 2002 and again in 2003. After analysing the results of these tests and the costs of building the machine, EB decided to put its development on indefinite hold. In March 2008, MCT installed its SeaGen machine, a 1.2 MW nameplate capacity grid-connected twin rotor pile mounted turbine that is a successor to the same company's Seaflow machine, in Strangford Narrows in Northern Ireland. When fully commissioned, the device will deliver electricity to the grid on a commercial basis. The machine is now fully functional, after replacing its broken rotor blades, and on 18 December 2008 it announced that the machine had generated 1.2 MW, its full nameplate capacity, for the first time. MCT has announced plans for a joint venture with Npower Renewables to develop a 10.5 MW farm at the Anglesey Skerries.

7.44 In February 2006, DECC launched the Marine Renewables Deployment Fund (MRDF) with total funding of £42 million to provide a 25 per cent capital grant and £100 per MWh additional revenue support for multi-device farms. In October 2006, the Scottish Executive announced the Scottish Ministers' Wave and Tidal Energy Support Scheme (WATES), closely modelled on the DECC scheme but with a 40 per cent capital grant, different eligibility criteria and a budget of £8 million. In January 2008 an Energy Bill began its progress through Parliament and is expected to become law in mid 2008. This introduces a banding structure into the Renewables Obligation that will enable wave and tidal to claim two ROCs per MWh instead of one as currently. In September 2008, the Scottish Government issued a consultation document in which it proposed to award a multiple of five Renewables Obligation Certificates (ROCs) for wave generation and three for tidal. This is in contrast to the proposal from the UK Government, first set out in the 2007 Energy White Paper, to award two ROCs to both wave and tidal. At the time of writing, the proposal is awaiting EU State Aid approval.

7.45 The Limpet remains the only wave device consistently supplying wave energy to the grid, while MCT's SeaGen tidal device is expected to achieve a similar status soon. The only commercial facilities operating by 2010 are likely to be those constructed under DECC's MRDF and the Scottish Executive's WATES schemes. These are not expected to amount to more than around 25 MW of capacity in total, the majority of which will come on stream after 2010.

Large scale hydro

7.46 In hydro schemes the turbines that drive the electricity generators are powered by the direct action of water either from a reservoir or from the run of the river. Large-scale hydro covers plants with a capacity of 5 MW and over. Most of the plants are located in Scotland and Wales and mainly draw their water from high-level reservoirs with their own natural catchment areas. Major Power Producers (MPPs) report their output to DECC in regular electricity surveys. Prior to 2004 these data were submitted in aggregate form and not split down by size of scheme. This meant that some small-scale schemes were hidden within the generation data for the large-scale schemes. Since 2004 MPPs have provided a more detailed breakdown of their data and some smaller sites included under "large scale" before 2004 are now under "small scale". There is some 1,456 MW of installed capacity for large-scale hydroelectric schemes in the UK, an increase of about 98 MW over 2007. This was due to the Glendoe project, the largest hydro scheme built for many years, going operational. The coverage of these large-scale hydro figures is the same as that used in the tables in the Chapter 5 of this Digest. The data in this Chapter exclude pumped storage stations (see paragraph 5.60).

Small scale hydro

7.47 Electricity generation schemes with a hydro capacity below 5 MW are classified as small scale. These are schemes being used for either domestic/farm purposes or for local sale to electricity supply companies. The results from this exercise were supplemented with a survey of small-scale schemes undertaken in 2008 which essentially helped to 'clean up' the data. Currently there is 173 MW of installed small-scale hydro schemes. Of this, 57 per cent is owned by small-scale energy producers with the remainder owned by major power producers. Of the 317 schemes in existence, 79 per cent of schemes claim ROCs, with 43 schemes having current NFFO contracts. Compared to 2007, there has been an increase in installed capacity of 7 MW.

Geothermal aquifers

7.48 Aquifers containing water at elevated temperatures occur in some parts of the United Kingdom at between 1,500 and 3,000 metres below the surface. This water can be pumped to the surface and used, for example, in community heating schemes. There is currently only one scheme operating in the UK at Southampton.

Biomass

(a) Landfill gas

7.49 Landfill gas is a methane-rich biogas formed from the decomposition of organic material in landfill. The gas can be used to fuel reciprocating engines or turbines to generate electricity or used directly in kilns and boilers. In other countries, the gas is cleaned to pipeline quality or used as a vehicle fuel. Landfill gas exploitation has benefited considerably from NFFO and this can be seen from the large rise in the amount of electricity generated since 1992. Further commissioning of landfill gas projects under NFFO will continue to increase the amount of electricity generated from this technology. Ofgem's ROCs database also provides details of landfill gas sites claiming ROCs. Information on landfill gas was supplemented by a RESTATS survey carried out by AEA in 2008 on behalf of DECC, and covered the period up to the end of 2007, as part of data cleansing activities. In 2007 the number of operating landfill gas sites increased by 12, with a corresponding increase in installed capacity of 8 MW.

(b) Sewage sludge digestion

7.50 In all sewage sludge digestion projects, some of the gas produced is used to maintain the optimum temperature for digestion. In addition, many use combined heat and power (CHP) systems. The electricity generated is either used on site or sold under the NFFO. Information from these projects was provided from the CHAPSTATS Database, which is compiled and maintained by AEA on behalf of DECC (see Chapter 6). Within the CHAPSTATS database the majority of the data are gathered through the CHP Quality Assurance (CHPQA) Programme. However, many sewage treatment works are not part of the CHPQA Programme, and to allow these CHP schemes to be included in the statistics data provided to Ofgem, via the ROC registers, is used. In respect of these schemes, estimates of electrical efficiencies and heat to power ratios typical of the technology and capacity are used to determine fuel inputs and heat outputs. In this year's statistics, data for 38 per cent of the schemes (52 per cent by electrical capacity) were from CHPQA and data for 62 per cent of schemes (48 per cent by capacity) were from RESTATS (ie ROCs registers).

(c) Domestic wood combustion

7.51 Domestic wood use includes the use of logs in open fires, “AGA”-type cooker boilers and other wood burning stoves. Up to 2002 the figure given for each year is an approximate estimate based on a survey carried out in 1989. The Forestry Commission carried out a survey of domestic wood fuel use in 1997 but the results from this were inconclusive. As an upper limit, about 600,000 oven-dried tonnes (ODTs) were estimated to be available for domestic heating. In 2001, AEA undertook a study of UK domestic wood use. A methodology was devised for surveying the three major sectors involved in wood use – the stove or boiler supplier, the wood supplier and the end user. Questionnaires were devised for all these parties and then attempts were made to contact representative samples in the various regions of the UK. From the evidence obtained via the questionnaires and telephone interviews, we believe that the domestic wood burning market is growing, but not in the area of wood as the primary heat source. This still remains a relatively small market and a small percentage of the wood burnt. Unfortunately, the survey was unable to provide statistically sound evidence as to the amount of wood used in the domestic sector and although it was felt that there has been a small increase in the domestic use of wood as a fuel, on the basis of the results of the approach, at the time AEA could not justify modifying the current estimate for the UK. In view of the importance attached to finding out about domestic wood use, the Forestry Commission decided to undertake another study guided by the lessons learnt from the previous work. In particular they would approach the newly emerging wood cooperatives, as they are likely to be a good source of information now that they should be more well established, the National House-Building Council (NHBC) to examine new build and treating equipment suppliers, fuel suppliers and users under separate surveys. This work is ongoing. In 2005, as part of an omnibus survey, a pilot study was undertaken in Scotland by the Forestry Commission to assist in developing the correct methodology prior to a national survey, but unfortunately the response rate was poor. A review of a different approach to calculating domestic wood use has suggested that we have been underestimating the use of this resource in recent years and, following peer review, are now confident enough to remain with the historic changes to these data, made in 2008, the first time since the survey began in 1989. This was based on a 50 per cent growth rate over a 2-3 year period based on anecdotal information and subsequently supported from other sources (HETAS, National Association of Chimney Sweeps and discussions with a risk assessor acting on behalf of insurance companies). This approach has given a provisional figure for 2008, to be revised at a later date when we have better information. This year, the Forestry Commission undertook a wood fuel study; provisional figures are provided in ‘Woodfuel Statistics (2008 provisional figures)’ but figures for end use were not gathered. The results given (723 ktoe) were from the point of view of total estimated wood fuel production for domestic and industrial use, but this could also include co-firing feedstock; the RESTATS estimate gives about 466 ktoe. As such, we will remain with our current figures for this year, but these may be revised in future years in the light of further information from the Forestry Commission.

(d) Industrial wood combustion

7.52 In 1997, the industrial wood figure (which includes sawmill residues, furniture manufacturing waste etc.) was included as a separate category for the first time. This was due to the availability of better data as a result of a survey carried out in 1996 on wood fired combustion plants above 400 kW thermal input. A follow-up surveys in 2000 and 2006 highlighted that the in-house use of wood was in decline than in 1996 due to the imposition of more stringent emissions control. There is, however, increased interest in off-site use of untreated wood for space heating in schools, hospitals, nursing homes, government buildings, etc. In 2009, a follow up survey of industrial wood use was undertaken, together with an analysis of schemes receiving funding under the Bio-Energy Capital Grants Scheme (BECGS) which has seen significant growth in the biomass heating sector over the last 5 years; the analysis included data from Rounds 1-4 with many installations between 50 kW - 500 kW. The industrial wood scheme surveys showed a further decline with fewer than 50 plants in operation (consuming 270 thousand tonnes of wood). The results from the BECGS data highlighted strong growth with over 65 MWth installed (consuming 58 thousand tonnes of wood); it is anticipated that this installed figure will more than double over the next two years. Untreated wood will increasingly form a major fuel input to schemes involving energy crops; this is further discussed in the next section.

(e) Energy crops and forestry residues

7.53 Short rotation willow coppice plantations (SRC) have become well established but the rate of uptake of the technology has been very slow. Interest has also been shown in Miscanthus. Over 500 hectares of SRC have been planted in the south of Scotland and northern England to supply the Steven’s Croft, Lockerbie 44 MWe project. Further plantings are planned to increase the

supply in the coming years both for Lockerbie and Sembcorp (see below). Some SRC from the plantings made for the ARBRE project (see below), have been used for co-firing in coal-fired power stations. In December 2007 a new support scheme for energy crops was introduced by the Department for Environment Food and Rural Affairs (Defra), administered by Natural England, as part of the Rural Development Programme for England (RDPE) 2007-2013.

7.54 In England, Project ARBRE in South Yorkshire was contracted under NFFO 3 to generate 10 MW of electricity of which 8 MW were to be exported to the local grid. This project ran into difficulties and is believed to have been abandoned. However, SembCorp Utilities UK has completed a 32 MW wood-burning power station, burning 55,000 tonnes a year of SRC, with the balance recovered wood, forestry residues and sawmill co-product at the Wilton facility on Teesside. It entered commercial operation in summer 2007. The 44 MW plant at Steven's Croft near Lockerbie has also entered commercial service, fuelled mainly by forestry, sawmill co-product, and recovered wood. There is an intention to replace 25 per cent of this fuel by SRC. A 2.6 MW plant in Eccleshall, burning wood and Miscanthus, built by Eccleshall Biomass Ltd started commercial operation in summer 2007. The Port Talbot Bioenergy Plant, a 14 MW electric scheme firing mostly forestry residues and saw mill co-product entered service in June 2008.

(f) Straw combustion

7.55 Straw can be burnt in high temperature boilers, designed for the efficient and controlled combustion of solid fuels and biomass to supply heat, hot water and hot air systems. There are large numbers of these small-scale batch-fed whole bale boilers. The figures given are estimates based partly on 1990 information and partly on a survey of straw-fired boilers carried out in 1993-94. A 40 MW straw fired power station near Ely, Cambridgeshire is currently the only electricity generation scheme in operation.

(g) Waste combustion

7.56 Domestic, industrial and commercial wastes represent a significant resource for materials and energy recovery. Wastes may be combusted, as received, in purpose built incinerators or processed into a range of refuse derived fuels for both on-site and off-site utilisation. Only the non-biodegradable portion of waste is counted in renewables statistics although non-biodegradable wastes are included in this chapter as "below the line" items. The paragraphs below describe various categories of waste combustion in greater detail.

7.57 In 2008, 21 waste-to-energy plants were in operation, burning municipal solid waste (MSW), refuse derived fuel (RDF) and general industrial waste (GIW).

7.58 **Municipal solid waste combustion (MSW):** Information was provided from the refuse incinerator operators in the United Kingdom that practice energy recovery using the RESTATS questionnaire. This included both direct combustion of unprocessed MSW and the combustion of RDF. In the latter, process waste can be partially processed to produce coarse RDF that can then be burnt in a variety of ways. By further processing the refuse, including separating off the fuel fraction, compacting, drying and densifying, it is possible to produce an RDF pellet. This pellet has around 60 per cent of the gross calorific value of British coal. The generation from MSW has been split between biodegradable sources and non-biodegradable sources using information outlined in paragraph 7.59 below. Approximately 62.5 per cent of generation from MSW was estimated to be from biodegradable sources. Non-biodegradable municipal solid waste is not included in the overall renewables percentage under the international definition of renewables (see paragraph 7.1). However, such wastes are still shown in the tables accompanying this chapter as 'below the line' items.

7.59 There has been an ongoing programme of waste analysis in the UK for many years; such analyses may be carried out to an accuracy of ± 1 per cent. Such studies are guided by the use of ACORN (which stands for A Classification Of Residential Neighbourhoods) socio-economic profiles which are used to select sample areas for the analysis of household collected waste and is based on the premise that households of similar socio-economic characteristics are likely to have similar behavioural, purchasing and lifestyle characteristics; this will be reflected in the quantity and composition of waste that those households produce. The large scale study in Wales showed that the only category in domestic waste to show a statistically significant seasonal variation was garden waste; as garden waste is a small percentage (certainly when compared to food and kitchen waste), the effect on the operation of biomass-to-energy plants should be almost unnoticed. As there is now

virtually no regional variation to be seen within the UK; these data will probably become the UK standard. UK domestic waste has a biodegradable content of 67.5 per cent \pm 1 per cent and this accounts for about 62.5 per cent of the energy generated from its combustion. MSW comprises domestic waste plus other feedstocks, such as, general industrial waste, building demolition waste and tree clippings from civil amenities. This has the net effect of reducing the percentage composition of the biodegradable content to 61 per cent \pm 1 per cent. Because the combustion properties of some of the other biodegradable materials added is similar to that of domestic waste, this has virtually no effect on the percentage of the energy generated from the biodegradables component, which remains at about 62.5 per cent.

7.60 General industrial waste combustion (GIW): Certain wastes produced by industry and commerce can be used as a source of energy for industrial processes or space heating. These wastes include general waste from factories such as paper, cardboard, wood and plastics.

7.61 A survey conducted in 2001 noted that GIW is now burnt in MSW waste-to-energy facilities. As no sites are solely burning GIW for heat or electricity generation, this feedstock is being handled under the MSW category.

7.62 Specialised waste combustion: Specialised wastes arise as a result of a particular activity or process. Materials in this category include scrap tyres, hospital wastes, poultry litter, meal and bone and farm waste digestion. Although the large tyre incineration plant with energy recovery has not generated since 2000 the cement industry has burned some waste tyres in its cement and lime kilns. Although part of waste tyre combustion is of biodegradable waste, because there is no agreed method of calculating the small biodegradable content, all of the generation from waste tyres has been included under non-biodegradable wastes in this chapter (see paragraph 7.59, above).

7.63 Information on hospital waste incineration has continued to be based on a RESTATS survey, carried out by AEA in 2007 which aimed to establish if there were any changes and developments in the market. The results revealed an ongoing process of centralisation and consolidation, as the industry responds to changes in pollution emissions and clinical waste regulations. It also documented the closure of many smaller incineration facilities with energy recovery, for which the costs of compliance with regulations were no longer viable. Despite this, the survey established that energy recovery in this field does have a future, with three new sites for power generation being developed; a new survey will shortly be undertaken.

7.64 One poultry litter combustion project started generating electricity in 1992; a second began in 1993. Both of these are NFFO projects. In addition, a small-scale CHP scheme began generating towards the end of 1990. However, this has now closed due to new emissions regulations. A further NFFO scheme started generating in 1998, and during 2000 an SRO scheme began to generate. A further poultry litter scheme became fully operational in 2001. One of the earlier poultry litter projects was modified to be fuelled mainly by meat and bone; two additional schemes fuelled primarily by meat and bone have also been built.

7.65 Information on farm waste digestion in the United Kingdom is based on a survey carried out during 1991-1992 with follow-up studies in 1996 and 2005. There was a farm digestion project generating electricity under the NFFO; its output was included in the commodity balances but ceased to operate in 1998. In 2003, however, a large centralised anaerobic digestion scheme (Holsworthy) generating electricity under NFFO 5 came on-line. With the exception of this scheme, data collected from the surveys were used to derive estimates for 1997 through to 2004. The 2005 survey showed that number of sites using farm waste digestion fell significantly since 1996, which was mainly attributed to tightening waste regulations and lack of maintenance. However, this has not prevented new digesters being built and commissioned in since 2006. A new survey will shortly be undertaken.

(h) Co-firing of biomass with fossil fuels

7.66 Co-firing of biomass fuel in fossil fuel power stations is not a new idea. Technically it has been proven in power stations worldwide, although, until 2002, it was not practised in the UK. The biomass fuel is usually fed by means of the existing stoking mechanism as a partial substitute for the fossil fuel. The combustion system may cope with up to a 25 per cent substitution without any major changes to the boiler design and airflows, but fuel preparation and transport systems may be the limiting feature at percentages much lower than this.

7.67 Since 2002, co-firing of biomass with fossil fuels has been eligible under the RO, the first time that any renewable energy initiative has included co-firing. Compared with other renewables, co-firing is relatively low cost and quick to implement. As such, the following limits were originally placed on co-firing to prevent a high volume of co-firing reducing the value in the RO for other renewables whilst enabling markets and supply chains for biomass to develop:

- Only electricity generated before 1 April 2011 would be eligible;
- From 1 April 2006 at least 25 per cent of the biomass used must consist of energy crops.

7.68 The scheme was later extended to allow longer for an energy crop market to develop and to recognise the need to reduce CO₂ emissions from coal-fired generation as the role that coal will play in the UK's generation has increased. The current position is that there is no cap on co-firing with energy crops. However, to reduce the risk of flooding the ROC market with co-fired ROCs, thereby affecting ROC prices and investor confidence adversely, there is a limit on the number of co-fired ROCs using non-energy crop biomass a supplier can present to Ofgem when demonstrating that it has met its obligation. This is currently set at 10 per cent rising to 12.5% from 2010-11.

7.69 In May 2007 the Government published the Energy White Paper, "Meeting the Energy Challenge". This proposed banding the RO, where different levels of support are given to different renewable technologies which came into effect in 'Renewables Obligation 2009' on 1 April 2009. Co-firing with non-energy crops has been moved into a band receiving 0.5 ROC per MWh. This will allow more co-firing to come forward but at an appropriate support level, minimising the risk of co-firing impacting negatively on other renewables.

(i) Biodiesel and bioethanol (liquid biofuels)

7.70 In the UK biodiesel is defined for taxation purposes as diesel quality liquid fuel produced from biomass or waste vegetable and animal oils and fats, the ester content of which is not less than 96.5 per cent by weight and the sulphur content of which does not exceed 0.005 per cent by weight or is nil. Diesel fuel currently sold at a number of outlets is a blend with 5 per cent biodiesel. Bioethanol is defined for taxation purposes as a petrol quality liquid fuel consisting of ethanol produced from biomass ie from vegetable and animal substances consisting of the biodegradable fraction of products, wastes and residues from agriculture, forestry and related activities, or industrial and municipal waste. For further information see www.hmrc.gov.uk and search for 'Biodiesel' and 'Bioethanol' and www.uktradeinfo.co.uk/index.cfm?task=bulloil.

7.71 The Renewable Transport Fuel Obligation (RTFO), introduced in April 2008, places a legal requirement on transport fuel suppliers (ie those who supply more than 450,000 litres of fossil fuel per annum to the UK market) to ensure that a specified percentage (by volume) of their overall fuel sales is from a renewable source. The targets have recently been adjusted in the light of the Gallagher review into the indirect effects of biofuels and the subsequent consultation. The target for 2009/10 is now 3.25 per cent, for 2010/11 is 3.5 per cent and subsequently rises by 0.5 percentage points per year to 5 per cent in 2013/14. Once the 5 per cent level is reached it is estimated that it will save around a million tonnes of carbon per annum.

Combined Heat and Power

7.72 A CHP plant is an installation where there is a simultaneous generation of usable heat and power (usually electricity) in a single process. Some CHP installations are fuelled either wholly or partially by renewable sources of energy. The main renewable sources that are used for CHP are biomass particularly sewage gas.

7.73 Chapter 6 of this Digest summarises information on the contribution made by CHP to the United Kingdom's energy requirements in 2004 to 2008 using the results of annual studies undertaken to identify all CHP schemes. Included in Tables 6.1 to 6.9 of that chapter is information on the contribution of renewable sources to CHP generation in each year from 2004 to 2008. Corresponding data for 1996 to 2003 are available on the DECC energy web site. The information contained in those tables is therefore a subset of the data contained within the tables presented in this chapter.

Generating capacity and load factor

7.74 The electrical capacities are given in Table 7.4 as installed capacities ie the maximum continuous rating of the generating sets in the stations. In Chapter 5 Declared Net Capacity (DNC) is used, ie the maximum continuous rating of the generating sets in the stations, less the power consumed by the plant itself, and reduced by a specified factor to take into account the intermittent nature of the energy source e.g. 0.43 for wind, 0.365 for small hydro and 0.33 for shoreline wave. DNC represents the nominal maximum capability of a generating set to supply electricity to consumers. For electrical capacities of generation using renewables in DNC terms see Table 7.1.1 on the DECC energy web site. Further information on these factors is available at www.restats.org.uk/methodologies.htm

7.75 Plant load factors in this chapter have been calculated in terms of installed capacity (ie the maximum continuous rating of the generating sets in the stations) and express the average hourly quantity of electricity generated as a percentage of the average of the capacities at the beginning and end of the year.

7.76 In the 2006 Digest a new term was introduced to describe the amount of electricity generated from wind farms compared with the amount that such turbines would have generated had they been available for the whole of the calendar year and running continually and at maximum output throughout the calendar year. This term is "load factor on an unchanged configuration basis". A full account of the exercise to derive these factors can be found in *Energy Trends*, March 2006 pages 28 to 32. *Energy Trends* is available on the DECC energy web site at www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx, although here the term "capacity factor" was used.

7.77 To compare the two calculations, the **load factor** for a calendar year (as historically reported in this Digest) is:

$$\frac{\text{Electricity generated during the year (kWh)}}{(\text{Installed capacity at the beginning of the year} + \text{Installed capacity at the end of the year (kW)}) \times 0.5 \times 8760 \text{ hours}}$$

whilst the **load factor on an unchanged configuration basis** for a calendar year is:

$$\frac{\text{Electricity generated during the year (kWh)}}{(\text{Installed capacity of wind farms operating throughout the year with an unchanged configuration (kW)}) \times 8760 \text{ hours}}$$

In addition, because load factors on an unchanged configuration basis are mainly of interest for commercial scale wind power rather than small/micro generation, turbines under 100 kW are excluded and any single turbine of 100 kW or above is considered to be a wind farm.

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7.1 Commodity balances 2008

Renewables and waste

Thousand tonnes of oil equivalent

	Wood waste	Wood	Poultry litter, meat and bone, and farm waste	Straw, SRC, and other plant-based biomass (3)	Sewage gas	Landfill gas
Supply						
Production	108	359	296	426	245	1,574
Other sources	-	-	-	-	-	-
Imports	-	-	-	416	-	-
Exports	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-
Stock change (1)	-	-	-	-	-	-
Transfers	-	-	-	-	-	-
Total supply	108	359	296	843	245	1,574
Statistical difference (2)	-	-	-	-	-	-
Total demand	108	359	296	843	245	1,574
Transformation	-	-	253	715	185	1,560
Electricity generation	-	-	253	715	185	1,560
Major power producers	-	-	170	524	-	-
Autogenerators	-	-	83	191	185	1,560
Heat generation	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-
Other	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-
Other	-	-	-	-	-	-
Losses	-	-	-	-	-	-
Final consumption	108	359	42	128	60	14
Industry	108	-	40	56	-	14
Unclassified	108	-	40	56	-	14
Iron and steel	-	-	-	-	-	-
Non-ferrous metals	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-
Paper, printing, etc	-	-	-	-	-	-
Other industries	-	-	-	-	-	-
Construction	-	-	-	-	-	-
Transport	-	-	-	-	-	-
Air	-	-	-	-	-	-
Rail	-	-	-	-	-	-
Road	-	-	-	-	-	-
National navigation	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-
Other	-	359	2	72	60	-
Domestic	-	359	-	-	-	-
Public administration	-	-	-	-	60	-
Commercial	-	-	-	-	-	-
Agriculture	-	-	2	72	-	-
Miscellaneous	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-

(1) Stock fall (+), stock rise (-).

(2) Total supply minus total demand.

(3) SRC is short rotation coppice.

(4) Municipal solid waste, general industrial waste and hospital waste.

(5) The amount of shoreline waste included is less than 0.05 ktoe.

7.1 Commodity balances 2008 (continued)

Renewables and waste

Thousand tonnes of oil equivalent

Waste ⁽⁴⁾ and tyres	Geothermal and active solar heat	Hydro	Wind and wave (5)	Liquid biofuels	Total renewables	
						Supply
1,002	58	444	610	294	5,416	Production
-	-	-	-	-	-	Other sources
-	-	-	-	532	948	Imports
-	-	-	-	-	-	Exports
-	-	-	-	-	-	Marine bunkers
-	-	-	-	-	-	Stock change (1)
-	-	-	-	-	-	Transfers
1,002	58	444	610	825	6,364	Total supply
-	-	-	-	-	-	Statistical difference (2)
1,002	58	444	610	825	6,364	Total demand
817	1	444	610	5	4,592	Transformation
817	1	444	610	5	4,592	Electricity generation
56	-	363	461	-	1,574	Major power producers
761	1	81	150	5	3,018	Autogenerators
-	-	-	-	-	-	Heat generation
-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	Other
-	-	-	-	-	-	Energy industry use
-	-	-	-	-	-	Electricity generation
-	-	-	-	-	-	Oil and gas extraction
-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	Other
-	-	-	-	-	-	Losses
185	57	-	-	821	1,772	Final consumption
119	-	-	-	-	336	Industry
119	-	-	-	-	336	Unclassified
-	-	-	-	-	-	Iron and steel
-	-	-	-	-	-	Non-ferrous metals
-	-	-	-	-	-	Mineral products
-	-	-	-	-	-	Chemicals
-	-	-	-	-	-	Mechanical engineering, etc
-	-	-	-	-	-	Electrical engineering, etc
-	-	-	-	-	-	Vehicles
-	-	-	-	-	-	Food, beverages, etc
-	-	-	-	-	-	Textiles, leather, etc
-	-	-	-	-	-	Paper, printing, etc
-	-	-	-	-	-	Other industries
-	-	-	-	-	-	Construction
-	-	-	-	821	821	Transport
-	-	-	-	-	-	Air
-	-	-	-	-	-	Rail
-	-	-	-	821	821	Road
-	-	-	-	-	-	National navigation
-	-	-	-	-	-	Pipelines
66	57	-	-	-	615	Other
16	56	-	-	-	430	Domestic
39	0	-	-	-	99	Public administration
11	0	-	-	-	12	Commercial
-	-	-	-	-	74	Agriculture
-	-	-	-	-	-	Miscellaneous
-	-	-	-	-	-	Non energy use

7.2 Commodity balances 2007

Renewables and waste

Thousand tonnes of oil equivalent

	Wood waste	Wood	Poultry litter, meat and bone, and farm waste	Straw, SRC, and other plant-based biomass (3)	Sewage gas	Landfill gas
Supply						
Production	101r	332r	270	495	213r	1,547
Other sources	-	-	-	-	-	-
Imports	-	-	-	378	-	-
Exports	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-
Stock change (1)	-	-	-	-	-	-
Transfers	-	-	-	-	-	-
Total supply	101r	332r	270	873	213r	1,547
Statistical difference (2)	-	-	-	-	-	-
Total demand	101r	332r	270	873	213r	1,547
Transformation	-	-	223	776r	163r	1,534
Electricity generation	-	-	223	776r	163r	1,534
Major power producers	-	-	146r	422r	-	-
Autogenerators	-	-	77r	354r	163r	1,534
Heat generation	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-
Other	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-
Other	-	-	-	-	-	-
Losses	-	-	-	-	-	-
Final consumption	101r	332r	48	97	50r	14
Industry	101r	-	46	25	-	14
Unclassified	101r	-	46	25	-	14
Iron and steel	-	-	-	-	-	-
Non-ferrous metals	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-
Paper, printing, etc	-	-	-	-	-	-
Other industries	-	-	-	-	-	-
Construction	-	-	-	-	-	-
Transport	-	-	-	-	-	-
Air	-	-	-	-	-	-
Rail	-	-	-	-	-	-
Road	-	-	-	-	-	-
National navigation	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-
Other	-	332r	2	72	50r	-
Domestic	-	332r	-	-	-	-
Public administration	-	-	-	-	50r	-
Commercial	-	-	-	-	-	-
Agriculture	-	-	2	72	-	-
Miscellaneous	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-

(1) Stock fall (+), stock rise (-).

(2) Total supply minus total demand.

(3) SRC is short rotation coppice.

(4) Municipal solid waste, general industrial waste and hospital waste.

(5) The amount of shoreline waste included is less than 0.05 ktoe.

7.2 Commodity balances 2007 (continued)

Renewables and waste

Thousand tonnes of oil equivalent

Waste ⁽⁴⁾ and tyres	Geothermal and active solar heat	Hydro	Wind and wave (5)	Liquid biofuels	Total renewables	
						Supply
956	47	438	453	396	5,248r	Production
-	-	-	-	-	-	Other sources
-	-	-	-	-	378	Imports
-	-	-	-	-34	-34	Exports
-	-	-	-	-	-	Marine bunkers
-	-	-	-	-	-	Stock change (1)
-	-	-	-	-	-	Transfers
956	47	438	453	362	5,592r	Total supply
-	-	-	-	-	-	Statistical difference (2)
956	47	438	453	362	5,592r	Total demand
785	1	438	453	-	4,372r	Transformation
785	1	438	453	-	4,372r	Electricity generation
58	-	356	307r	-	1,288r	Major power producers
727	1	81	147r	-	3,083r	Autogenerators
-	-	-	-	-	-	Heat generation
-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	Other
-	-	-	-	-	-	Energy industry use
-	-	-	-	-	-	Electricity generation
-	-	-	-	-	-	Oil and gas extraction
-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	Other
-	-	-	-	-	-	Losses
171	46	-	-	362	1,220r	Final consumption
90	-	-	-	-	276r	Industry
90	-	-	-	-	276r	Unclassified
-	-	-	-	-	-	Iron and steel
-	-	-	-	-	-	Non-ferrous metals
-	-	-	-	-	-	Mineral products
-	-	-	-	-	-	Chemicals
-	-	-	-	-	-	Mechanical engineering, etc
-	-	-	-	-	-	Electrical engineering, etc
-	-	-	-	-	-	Vehicles
-	-	-	-	-	-	Food, beverages, etc
-	-	-	-	-	-	Textiles, leather, etc
-	-	-	-	-	-	Paper, printing, etc
-	-	-	-	-	-	Other industries
-	-	-	-	-	-	Construction
-	-	-	-	362	362	Transport
-	-	-	-	-	-	Air
-	-	-	-	-	-	Rail
-	-	-	-	362	362	Road
-	-	-	-	-	-	National navigation
-	-	-	-	-	-	Pipelines
81	46	-	-	-	582r	Other
23	45r	-	-	-	400r	Domestic
39	0r	-	-	-	89r	Public administration
19	0r	-	-	-	20r	Commercial
-	-	-	-	-	74	Agriculture
-r	-	-	-	-	-r	Miscellaneous
-	-	-	-	-	-	Non energy use

7.3 Commodity balances 2006

Renewables and waste

	Thousand tonnes of oil equivalent					
	Wood waste	Wood	Poultry litter, meat and bone, and farm waste	Straw, SRC, and other plant-based biomass (3)	Sewage gas	Landfill gas
Supply						
Production	97r	299r	173r	538	195	1,465
Other sources	-	-	-	-	-	-
Imports	-	-	-	497	-	-
Exports	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-
Stock change (1)	-	-	-	-	-	-
Transfers	-	-	-	-	-	-
Total supply	97r	299r	173r	1,035	195	1,465
Statistical difference (2)	-	-	-	-	-	-
Total demand	97r	299r	173r	1,035	195	1,465
Transformation	-	-	149	948	149	1,451
Electricity generation	-	-	149	948	149	1,451
Major power producers	-	-	129	543	-	-
Autogenerators	-	-	19	405	149	1,451
Heat generation	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-
Other	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-
Other	-	-	-	-	-	-
Losses	-	-	-	-	-	-
Final consumption	97r	299r	25	87	46	14
Industry	97r	-	23	15r	-	14
Unclassified	97r	-	23	15r	-	14
Iron and steel	-	-	-	-	-	-
Non-ferrous metals	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-
Mechanical engineering, etc	-	-	-	-	-	-
Electrical engineering, etc	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-
Food, beverages, etc	-	-	-	-	-	-
Textiles, leather, etc	-	-	-	-	-	-
Paper, printing, etc	-	-	-	-	-	-
Other industries	-	-	-	-	-	-
Construction	-	-	-	-	-	-
Transport	-	-	-	-	-	-
Air	-	-	-	-	-	-
Rail	-	-	-	-	-	-
Road	-	-	-	-	-	-
National navigation	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-
Other	-	299r	2	72	46	-
Domestic	-	299r	-	-	-	-
Public administration	-	-	-	-	46	-
Commercial	-	-	-	-	-	-
Agriculture	-	-	2	72	-	-
Miscellaneous	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-

(1) Stock fall (+), stock rise (-).

(2) Total supply minus total demand.

(3) SRC is short rotation coppice.

(4) Municipal solid waste, general industrial waste and hospital waste.

(5) The amount of shoreline waste included is less than 0.05 ktoe.

7.3 Commodity balances 2006 (continued)

Renewables and waste

Thousand tonnes of oil equivalent

Waste ⁽⁴⁾ and tyres	Geothermal and active solar heat	Hydro	Wind and wave (5)	Liquid biofuels	Total renewables	
						Supply
918	38	395	363	231r	4,713r	Production
-	-	-	-	-	-	Other sources
-	-	-	-	-	497	Imports
-	-	-	-	-44	-44	Exports
-	-	-	-	-	-	Marine bunkers
-	-	-	-	-	-	Stock change (1)
-	-	-	-	-	-	Transfers
918	38	395	363	188	5,166r	Total supply
-	-	-	-	-	-	Statistical difference (2)
918	38	395	363	188	5,166r	Total demand
773	1	395	363	-	4,229	Transformation
773	1	395	363	-	4,229	Electricity generation
59	-	318	-	-	1,049	Major power producers
713r	1	77	363	-	3,180	Autogenerators
-	-	-	-	-	-	Heat generation
-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	Other
-	-	-	-	-	-	Energy industry use
-	-	-	-	-	-	Electricity generation
-	-	-	-	-	-	Oil and gas extraction
-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	Other
-	-	-	-	-	-	Losses
145	37	-	-	188	938r	Final consumption
65	-	-	-	-	213r	Industry
65	-	-	-	-	213r	Unclassified
-	-	-	-	-	-	Iron and steel
-	-	-	-	-	-	Non-ferrous metals
-	-	-	-	-	-	Mineral products
-	-	-	-	-	-	Chemicals
-	-	-	-	-	-	Mechanical engineering, etc
-	-	-	-	-	-	Electrical engineering, etc
-	-	-	-	-	-	Vehicles
-	-	-	-	-	-	Food, beverages, etc
-	-	-	-	-	-	Textiles, leather, etc
-	-	-	-	-	-	Paper, printing, etc
-	-	-	-	-	-	Other industries
-	-	-	-	-	-	Construction
-	-	-	-	188	188	Transport
-	-	-	-	-	-	Air
-	-	-	-	-	-	Rail
-	-	-	-	188	188	Road
-	-	-	-	-	-	National navigation
-	-	-	-	-	-	Pipelines
81	37	-	-	-	536r	Other
23	36r	-	-	-	358r	Domestic
39	0r	-	-	-	85r	Public administration
19r	0r	-	-	-	20r	Commercial
-	-	-	-	-	74	Agriculture
-r	-	-	-	-	-r	Miscellaneous
-	-	-	-	-	-	Non energy use

7.4 Capacity of, and electricity generated from, renewable sources

	2004	2005	2006	2007	2008
Installed Capacity (MWe) (1)					
Wind:					
Onshore	809.4	1,351.2	1,650.7	2,083.4	2,820.2
Offshore (2)	123.8	213.8	303.8	393.8	586.0
Shoreline wave	0.5	0.5	0.5	0.5	0.5
Solar photovoltaics	8.2	10.9	14.3	18.1r	22.5
Hydro:					
Small scale	142.9	157.9	153.4	166.2	173.3
Large scale (3)	1,355.9	1,343.2	1,361.4	1,358.7	1,456.5
Biomass:					
Landfill gas	722.2	817.8	856.2	900.6	908.3
Sewage sludge digestion	131.9	139.6	146.4	150.0r	152.2
Municipal solid waste combustion	300.6r	314.6r	326.5	326.4	375.9
Animal Biomass (4)	86.5	86.6	88.9	114.4	114.4
Plant Biomass (5)	89.8	99.5	132.4	189.5	193.3
Total biomass and wastes	1,331.0r	1,458.2r	1,550.4	1,680.9r	1,744.1
Total	3,771.6r	4,535.7r	5,034.4	5,701.6r	6,803.1
Co-firing (6)	146.2	308.8	310.2	247.6	226.9
Generation (GWh)					
Wind:					
Onshore (7)	1,736	2,501	3,574	4,491	5,792
Offshore (8)	199	403	651	783	1,305
Solar photovoltaics	4	8	11	14r	17
Hydro:					
Small scale	283	444	478	534	568
Large scale (3)	4,561	4,478	4,115	4,554	4,600
Biomass:					
Landfill gas	4,004	4,290	4,424	4,677	4,757
Sewage sludge digestion	440	470	456	496r	564
Municipal solid waste combustion (9)	971	964	1,083	1,177	1,226
Co-firing with fossil fuels	1,022	2,533	2,528	1,956	1,613
Animal Biomass (10)	565	468	434	555	587
Plant Biomass (11)	362	382	363	409	568
Total biomass	7,364	9,107	9,288	9,270r	9,315
Total generation	14,147	16,940	18,116	19,646r	21,597
Non-biodegradable wastes (12)	583	578	651	707	736
Load factors (per cent) (13)					
Onshore wind	26.6	26.4	27.2	27.5	27.0
Offshore wind	24.2	27.2	28.7	25.6	30.4
Hydro	37.1	37.5	34.8r	38.2	37.4
Biomass (excluding co-firing)	62.0r	58.5r	56.2r	56.7r	56.3
Total (including wastes)	43.3r	41.2r	38.7	39.1r	37.8
Load factors on an unchanged configuration basis (per cent) (14)					
Onshore wind	29.2	28.1	26.7	27.3	29.4
Offshore wind (from 2006 only)	..	..	27.5r	28.3	34.9

(1) Capacity on a DNC basis is shown in Long Term Trends Table 7.1.1 available on the DECC web site - see paragraph 7.74.

(2) In 2007 and 2008 excludes Beatrice (10 MW) which was only supplying an offshore oil platform.

(3) Excluding pumped storage stations. Capacities are as at the end of December.

(4) Includes the use of farm waste digestion, poultry litter and meat and bone.

(5) Includes the use of waste tyres, straw combustion, short rotation coppice and hospital waste.

(6) This is the amount of fossil fuelled capacity used for co-firing of renewables based on the proportion of generation accounted for by the renewable source.

(7) Actual generation figures are given where available, but otherwise are estimated using a typical load factor or the design load factor, where known.

(8) Latest years include electricity from shoreline wave but this amounts to less than 0.05 GWh. Generation by Beatrice excluded (see note 2).

(9) Biodegradable part only.

(10) Includes the use of farm waste digestion, poultry litter combustion and meat and bone combustion.

(11) Includes the use of straw and energy crops.

(12) Non-biodegradable part of municipal solid waste plus waste tyres, hospital waste and general industrial waste.

(13) Load factors are calculated based on installed capacity at the beginning and the end of the year - see paragraph 7.75.

(14) For a definition see paragraphs 7.76 and 7.77.

7.5 Electricity generated from renewable sources - Renewables Obligation basis

	GWh				
	2004	2005	2006	2007	2008
Generation : Renewables Obligation basis					
Wind:					
Onshore (1)	1,736	2,501	3,574	4,491	5,792
Offshore (2)	199	403	651	783	1,305
Solar photovoltaics	4	8	11	14r	17
Hydro:					
Small scale (1)	283	444	478	534	568
Other hydro including refurbished large scale	1,353	1,542r	1,969r	1,912r	1,794
Biomass:					
Landfill gas	4,004	4,290	4,424	4,677	4,757
Sewage sludge digestion	440	470	456	496r	564
Co-firing with fossil fuels	1,022	2,533	2,528	1,956	1,613
Animal Biomass (3)	565	468	434	555	587
Plant Biomass (4)	362	382	363	409	568
Total biomass	6,393	8,143	8,204	8,092r	8,090
Total renewables generation on an obligation basis (5)	9,968	13,040r	14,887r	15,826r	17,566

(1) Actual generation figures are given where available, but otherwise are estimated using a typical load factor or the design load factor, where known.

(2) Includes electricity from shoreline wave but this amounts to less than 0.05 GWh.

(3) Includes the use of farm waste digestion, poultry litter combustion and meat and bone combustion.

(4) Includes the use of straw and energy crops.

(5) See paragraphs 7.7 and 7.8 for definitions.

7.6 Renewable sources used to generate electricity and heat and for transport fuels⁽¹⁾⁽²⁾

	Thousand tonnes of oil equivalent				
	2004	2005	2006	2007	2008
Used to generate electricity (3)					
Wind:					
Onshore	149.3	215.1	307.3	386.2	498.0
Offshore (4)	17.1	34.6	56.0	67.3	112.2
Solar photovoltaics	0.3	0.7	0.9	1.2r	1.5
Hydro:					
Small scale	24.3	38.2	41.1r	46.0	48.8
Large scale (5)	392.2	385.0	353.9	391.6	395.5
Biomass:					
Landfill gas	1,313.1	1,407.2	1,451.1	1,533.9	1,560.3
Sewage sludge digestion	144.3	154.3	149.4	162.5r	185.1
Municipal solid waste combustion (6)	429.5	426.3	479.0	486.8	506.8
Co-firing with fossil fuels	335.1	830.7	829.0	641.4	528.9
Animal Biomass (7)	182.3	161.5	148.5	222.5	253.3
Plant Biomass (8)	118.8	125.2	119.0	134.1	186.3
Liquid biofuels	-	-	-	-	4.8
Total biomass	2,523.1	3,105.1	3,176.0	3,181.2r	3,225.5
Total	3,106.3	3,778.7	3,935.2	4,073.4r	4,281.6
Non-biodegradable wastes (9)	263.9	262.0	293.7	298.3	310.3
Used to generate heat					
Active solar heating	24.6	29.4	36.3	44.9	55.7
Biomass:					
Landfill gas	13.6	13.6	13.6	13.6	13.6
Sewage sludge digestion	54.8	53.6	45.7	50.0r	59.6
Wood combustion - domestic	232.4r	265.6r	298.8r	332.0r	358.6
Wood combustion - industrial	225.2r	93.1r	97.0r	101.2r	107.6
Animal Biomass (10)	2.0	14.4	24.9	47.8	42.4
Plant Biomass (11)	71.9	85.7	87.3	97.3	127.5
Municipal solid waste combustion (6)	33.7	33.7	33.7	33.7	31.5
Total biomass	633.6r	559.7r	601.1r	675.6r	740.7
Geothermal aquifers	0.8	0.8	0.8	0.8	0.8
Total	659.0r	589.9r	638.2r	721.3r	797.2
Non-biodegradable wastes (9)	115.7	127.5	111.6	137.3	153.7
Renewable sources used as transport fuels					
as Bioethanol	-	47.9	53.4	85.8	115.8
as Biodiesel	16.7	26.1	134.4	275.9r	705.0
Total	16.7	74.1	187.8	361.7r	820.7
Total use of renewable sources and wastes					
Solar heating and photovoltaics	24.9	30.1	37.2	46.1r	57.2
Onshore and offshore wind (4)	166.4	249.7	363.3	453.5	610.3
Hydro	416.5	423.2	394.9	437.5r	444.4
Biomass	3,156.6r	3,664.8r	3,777.1r	3,856.8r	3,966.2
Geothermal aquifers	0.8	0.8	0.8	0.8	0.8
Transport fuels	16.7	74.1	187.8	361.7r	820.7
Total	3,782.0r	4,442.6r	4,761.1r	5,156.4r	5,899.5
Non-biodegradable wastes (9)	379.6	389.5	405.3	435.6	464.1
All renewables and wastes (12)	4,161.6r	4,832.0r	5,166.4r	5,592.1r	6,363.6

(1) Includes some waste of fossil fuel origin.

(2) See paragraphs 7.33 to 7.77 for technical notes and definitions of the categories used in this table

(3) For wind, solar PV and hydro, the figures represent the energy content of the electricity supplied but for biomass the figures represent the energy content of the fuel used.

(4) Latest years includes electricity from shoreline wave but this is less than 0.05 ktoe.

(5) Excluding pumped storage stations.

(6) Biodegradable part only.

(7) Includes electricity from farm waste digestion, poultry litter combustion and meat and bone combustion.

(8) Includes electricity from straw and energy crops.

(9) Non-biodegradable part of municipal solid waste plus waste tyres, hospital waste, and general industrial waste.

(10) Includes heat from farm waste digestion, meat and bone combustion and sewage sludge combustion.

(11) Includes heat from straw, energy crops, paper and packaging.

(12) The figures in this row correspond to the total demand and total supply figures in Tables 7.1, 7.2 and 7.3.

7.7 Renewable sources data used to indicate progress under the EU Renewables Directive 2008 (net calorific value basis)

	Thousand tonnes of oil equivalent				
	2004	2005	2006	2007	2008
Renewables used for:					
Electricity generation (1)	1,266.5	1,506.4	1,613.7	1,750.1	1,920.4
Heat (2)	494.5	474.5	526.8	570.1	638.3
Biofuels for transport (2)	16.5	68.8	180.3	348.8	798.3
Total Renewables	1,777.5	2,049.7	2,320.8	2,669.0	3,357.0
Total Final Energy Consumption (3)	150,037.1	150,480.2	148,806.1	146,033.2	145,501.6
<i>plus Distribution losses for electricity</i>	2,642.1	2,379.5	2,356.9	2,275.9	2,358.2
<i>plus Distribution losses for heat</i>	-	-	-	-	-
<i>plus Consumption of electricity in the electricity and heat generation sectors</i>	1,537.2	1,603.6	1,682.6	1,626.0	1,513.3
<i>plus Consumption of heat in the electricity and heat generation sectors</i>	1.9	26.4	-	-	-
Gross Final Energy Consumption (GFEC)	154,218.4	154,489.8	152,845.6	149,935.2	149,373.0
<i>of which Air transport</i>	12,255.0	13,159.9	13,303.2	13,219.9	12,754.8
Air transport as a proportion of GFEC	7.95%	8.52%	8.70%	8.82%	8.54%
Air transport cap specified in Directive	6.18%	6.18%	6.18%	6.18%	6.18%
Capped air transport	9,530.7	9,547.5	9,445.9	9,266.0	9,231.3
Capped Gross Final Energy Consumption (CGFEC)	151,494.1	150,877.3	148,988.2	145,981.2	145,849.5
					TWh (4)
Renewables used for:					
Electricity generation (1)	14.7	17.5	18.8	20.4	22.3
Heat (2)	5.8	5.5	6.1	6.6	7.4
Biofuels for transport (2)	0.2	0.8	2.1	4.1	9.3
Total Renewables	20.7	23.8	27.0	31.0	39.0
Total Final Energy Consumption	1,744.9	1,750.1	1,730.6	1,698.4	1,692.2
<i>plus Distribution losses for electricity</i>	30.7	27.7	27.4	26.5	27.4
<i>plus Distribution losses for heat</i>	-	-	-	-	-
<i>plus Consumption of electricity in the electricity and heat generation sectors</i>	17.9	18.7	19.6	18.9	17.6
<i>plus Consumption of heat in the electricity and heat generation sectors</i>	0.0	0.3	-	-	-
Gross Final Energy Consumption (GFEC)	1,793.6	1,796.7	1,777.6	1,743.7	1,737.2
<i>of which Air transport</i>	142.5	153.1	154.7	153.7	148.3
Air transport as a proportion of GFEC	7.95%	8.52%	8.70%	8.82%	8.54%
Air transport cap specified in Directive	6.18%	6.18%	6.18%	6.18%	6.18%
Capped air transport	110.8	111.0	109.9	107.8	107.4
Capped Gross Final Energy Consumption (CGFEC)	1,761.9	1,754.7	1,732.7	1,697.8	1,696.2
Renewables consumption as a percentage of Capped Gross Final Energy Consumption	1.2%	1.4%	1.6%	1.8%	2.3%

(1) Includes non biodegradable wastes

(2) These correspond to the data in Table 7.6 adjusted to a Net Calorific Value basis

(3) Total final consumption less non-energy use in Annex I, Table I.1

(4) Thousand tonnes of oil equivalent figures have been converted to TWh using a factor of 0.01163.



Annexes

**Annex A: Energy and commodity
balances, conversion
factors and calorific values**

Annex B: Glossary and acronyms

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**Annex D: Major events in the Energy
Industry, 2007-2009**

Department of Energy and Climate Change

Annex A

Energy and commodity balances, conversion factors and calorific values

Balance principles

A.1 This Annex outlines the principles behind the balance presentation of energy statistics. It covers these in general terms. Fuel specific details are given in the appropriate chapters of this publication.

A.2 Balances are divided into two types, each of which performs a different function.

a) *commodity balance* – a balance for each energy commodity that uses the units usually associated with that commodity. By using a single column of figures, it shows the flow of the commodity from its sources of supply through to its final use. Commodity balances are presented in the individual fuel chapters of this publication.

b) *energy balance* - presents the commodity balances in a common unit and places them alongside one another in a manner that shows the dependence of the supply of one commodity on another. This is useful as some commodities are manufactured from others. The layout of the energy balance also differs slightly from the commodity balance. The energy balance format is used in Chapter 1.

A.3 Energy commodities can be either primary or secondary. Primary energy commodities are drawn (extracted or captured) from natural reserves or flows, whereas secondary commodities are produced from primary energy commodities. Crude oil and coal are examples of primary commodities, whilst petrol and coke are secondary commodities manufactured from them. For balance purposes, electricity may be considered to be both primary electricity (for example, hydro, wind) or secondary (produced from steam turbines using steam from the combustion of fuels).

A.4 Both commodity and energy balances show the flow of the commodity from its production, extraction or import through to its final use.

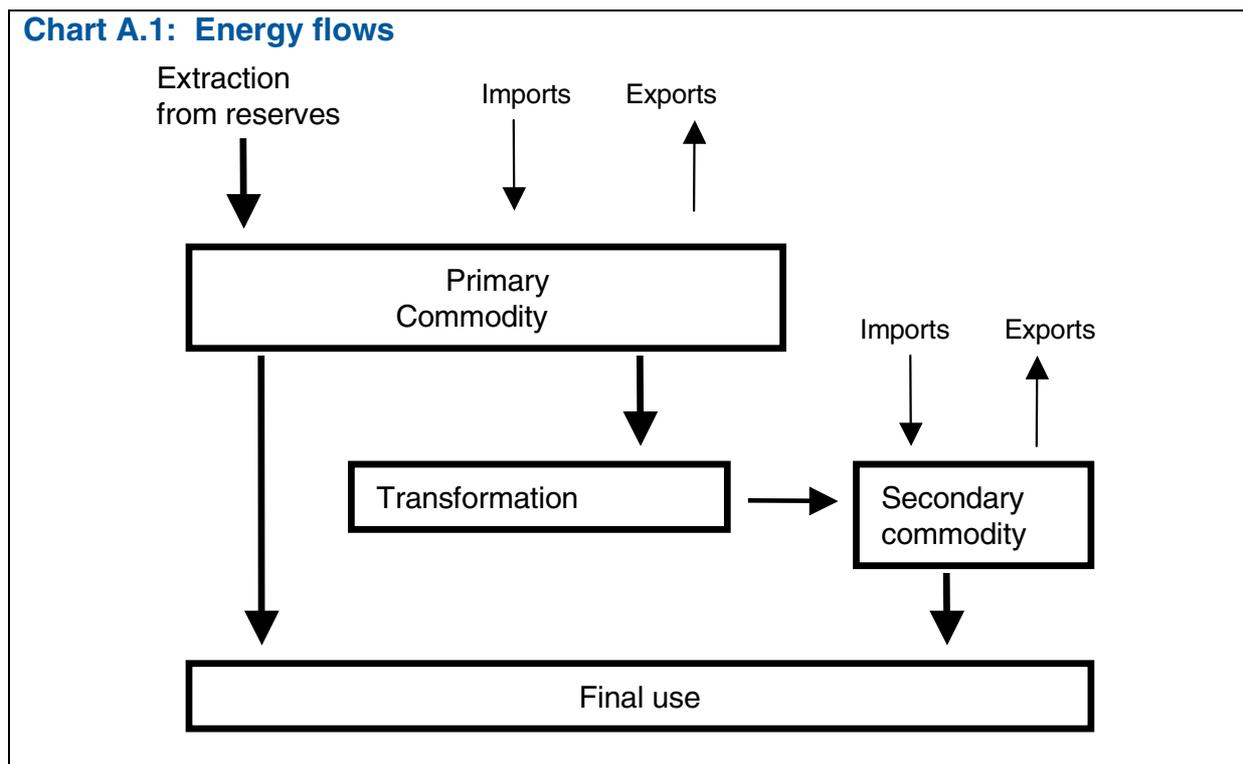
A.5 A simplified model of the commodity flow underlying the balance structure is given in Chart A.1. It illustrates how primary commodities may be used directly and/or be transformed into secondary commodities. The secondary fuels then enter final consumption or may also be transformed into another energy commodity (for example, electricity produced from fuel oil). To keep the diagram simple these “second generation” flows have not been shown.

A.6 The arrows at the top of the chart represent flows to and from the “pools” of primary and secondary commodities, from imports and exports and, in the case of the primary pool, extraction from reserves (eg the production of coal, gas and crude oil).

Commodity balances (Tables 2.1 to 2.6, 3.1 to 3.4, 4.1, 5.1, 5.3 and 7.1 to 7.3)

A.7 A commodity balance comprises a supply section and a demand section. The supply section gives available sources of supply (ie exports are subtracted). The demand section is divided into a transformation section, a section showing uses in the energy industries (other than for transformation) and a section covering uses by final consumers for energy or non-energy purposes. Final consumption for energy purposes is divided into use by sector of economic activity. The section breakdowns are described below.

Chart A.1: Energy flows



Supply

Production

A.8 Production, within the commodity balance, covers indigenous production (extraction or capture of primary commodities) and generation or manufacture of secondary commodities. Production is always gross, that is, it includes the quantities used during the extraction or manufacturing process.

Other sources

A.9 Production from other sources covers sources of supply that do not represent “new” supply. These may be recycled products, recovered fuels (slurry or waste coal), or electricity from pumped storage plants. The production of these quantities will have been reported in an earlier accounting period or have already been reported in the current period of account. Exceptionally, the *Other sources* row in the commodity balances for ethane, propane and butane is used to receive transfers of these hydrocarbons from gas stabilisation plants at North Sea terminals. In this manner, the supplies of primary ethane, propane and butane from the North Sea are combined with the production of these gases in refineries, so that the disposals may be presented together in the balances.

Imports and exports

A.10 The figures for imports and exports relate to energy commodities moving into or out of the United Kingdom as part of transactions involving United Kingdom companies. Exported commodities are produced in the United Kingdom and imported commodities are for use within the United Kingdom (although some may be re-exported before or after transformation). The figures thus exclude commodities either exported from or imported into HM Revenue and Customs bonded areas or warehouses. These areas, although part of the United Kingdom, are regarded as being outside of the normal United Kingdom’s customs boundary, and so goods entering into or leaving them are not counted as part of the statistics on trade used in the balances.

A.11 Similarly, commodities that only pass through the United Kingdom on their way to a final destination in another country are also excluded. However, for gas these transit flows are included because it is difficult to identify this quantity separately, without detailed knowledge of the contract information covering the trade. This means that for gas, there is some over statement of the level of imports and exports, but the net flows are correct.

A.12 The convention in these balances is that exports are shown with a negative sign.

Marine bunkers

A.13 These are deliveries of fuels (usually fuel oil or gas oil) to ships of any flag (including the United Kingdom) for consumption during the voyage to other countries. Marine bunkers are treated rather like exports and shown with a negative sign.

Stock changes

A.14 Additions to (- sign) and withdrawals from stocks (+ sign) held by producers and transformation industries correspond to withdrawals from and additions to supply, respectively.

Transfers

A.15 There are several reasons why quantities may be transferred from one commodity balance to another:

- a commodity may no longer meet the original specification and be reclassified;
- the name of the commodity may change through a change in use;
- to show quantities returned to supply from consumers. These may be by-products of the use of commodities as raw materials rather than fuels.

A.16 A quantity transferred from a balance is shown with a negative sign to represent a withdrawal from supply and with a positive sign in the receiving commodity balance representing an addition to its supply.

Total supply

A.17 The total supply available for national use is obtained by summing the flows above this entry in the balance.

Total demand

A.18 The various figures for the disposals and/or consumption of the commodities are summed to provide a measure of the demand for them. The main categories or sectors of demand are described in paragraphs A.31 to A.42.

Statistical difference

A.19 Any excess of supply over demand is shown as a statistical difference. A negative figure indicates that demand exceeds supply. Statistical differences arise when figures are gathered from a variety of independent sources and reflect differences in timing, in definition of coverage of the activity, or in commodity definition. Differences also arise for methodological reasons in the measurement of the flow of the commodity eg if there are differences between the volumes recorded by the gas producing companies and the gas transporting companies. A non-zero statistical difference is normal and, provided that it is not too large, is preferable to a statistical difference of zero as this suggests that a data provider has adjusted a figure to balance the account.

Transformation

A.20 The transformation sector of the balance covers those processes and activities that transform the original primary (and sometimes secondary) commodity into a form which is better suited for specific uses than the original form. Most of the transformation activities correspond to particular energy industries whose main business is to manufacture the product associated with them. Certain activities involving transformation take place to make products that are only partly used for energy needs (coke oven coke) or are by-products of other manufacturing processes (coke oven and blast furnace gases). However, as these products and by-products are then used, at least in part, for their energy content they are included in the balance system.

A.21 The figures given under the activity headings of this sector represent the quantities used for transformation. The production of the secondary commodities will be shown in the *Production* row of the corresponding commodity balances.

Electricity generation

A.22 The quantities of fuels burned for the generation of electricity are shown in their commodity balances under this heading. The activity is divided into two parts, covering the major power producers (for whom the main business is the generation of electricity for sale) and autogenerators (whose main business is not electricity generation but who produce electricity for their own needs and may also sell surplus quantities). The amounts of fuels shown in the balance represent the quantities consumed for the gross generation of electricity. Where a generator uses combined heat and power plant, the figures include only the part of the fuel use corresponding to the electricity generated.

A.23 In relation to autogenerators' data, the figures for quantities of fuel used for electricity generation appear under the appropriate fuel headings in the *Transformation* sector heading for *Autogenerators*, whilst the electricity generated appears in the *Electricity* column under *Production*. A breakdown of the information according to the branch of industry in which the generation occurs is not shown in the balance but is given in Chapter 1, Table 1.9. The figures for energy commodities consumed by the industry branches shown under final consumption include all use of electricity, but exclude the fuels combusted by the industry branches to generate the electricity.

Heat generation

A.24 The quantities of fuel burned to generate heat that is sold under the provision of a contract to a third party are shown in their commodity balances under this heading. It includes heat that is generated and sold by combined heat and power plants and by community heating schemes (also called district heating).

Petroleum refineries

A.25 Crude oil, natural gas liquids and other oils needed by refineries for the manufacture of finished petroleum products are shown under this heading.

Coke manufacture and blast furnaces

A.26 Quantities of coal for coke ovens and all fuels used within blast furnaces are shown under this heading. The consumption of fuels for heating coke ovens and the blast air for blast furnaces are shown under *Energy industry use*.

Patent fuel manufacture

A.27 The coals and other solid fuels used for the manufacture of solid patent fuels are reported under this heading.

Other

A.28 Any minor transformation activities not specified elsewhere are captured under this heading.

Energy industry use

A.29 Consumption by both extraction and transformation industries to support the transformation process (but not for transformation itself) are included here according to the energy industry concerned. Typical examples are the consumption of electricity in power plants (eg for lighting, compressors and cooling systems) and the use of extracted gases on oil and gas platforms for compressors, pumps and other uses. The headings in this sector are identical to those used in the transformation sector with the exception of *Pumped storage*. In this case, the electricity used to pump the water to the reservoir is reported.

Losses

A.30 This heading covers the intrinsic losses that occur during the transmission and distribution of electricity and gas (including manufactured gases). Other metering and accounting differences for gas and electricity are within the statistical difference, as are undeclared losses in other commodities.

Final consumption

A.31 *Final consumption* covers both final energy consumption (by different consuming sectors) and the use of energy commodities for non-energy purposes, that is *Non energy use*. Final consumption occurs when the commodities used are not for transformation into secondary commodities. The energy concerned disappears from the account after use. Any fuel used for electricity generation by

final consumers is identified and reported separately within the transformation sector. When an enterprise generates electricity, the figure for final consumption of the industrial sector to which the enterprise belongs includes its use of the electricity it generates itself (as well as supplies of electricity it purchases from others) but does not include the fuel used to generate that electricity.

A.32 The classification of consumers according to their main business follows, as far as practicable, the *Standard Industrial Classification (SIC2003)*. The qualifications to, and constraints on, the classification are described in the technical notes to Chapter 1. Table 1E in Chapter 1 shows the breakdown of final consumers used, and how this corresponds to the SIC2003.

Industry

A.33 Two sectors of industry (iron and steel and chemicals) require special mention because the activities they undertake fall across the transformation, final consumption and non-energy classifications used for the balances. Also, the data permitting an accurate allocation of fuel use within each of these major divisions are not readily available.

Iron and steel

A.34 The iron and steel industry is a heavy energy user for transformation and final consumption activities. Figures shown under final consumption for this industry branch reflect the amounts that remain after quantities used for transformation and energy sector own use have been subtracted from the industry's total energy requirements. Use of fuels for transformation by the industry may be identified within the transformation sector of the commodity balances.

A.35 The amounts of coal used for coke manufacture by the iron and steel industry are in the transformation sector of the coal balance. Included in this figure is the amount of coal used for coke manufacture by the companies outside of the iron and steel industry, ie solid fuel manufacturers. The corresponding production of coke and coke oven gas may be found in the commodity balances for these products. The use of coke in blast furnaces is shown in the commodity balance for coke, and the gases produced from blast furnaces and the associated basic oxygen steel furnaces are shown in the production row of the commodity balance for blast furnace gas.

A.36 Fuels used for electricity generation by the industry are included in the figures for electricity generation by autogenerators and are not distinguishable as being used by the iron and steel sector in the balances. Electricity generation and fuel used for this by broad industry group are given in Table 1.9.

A.37 Fuels used to support coke manufacture and blast furnace gas production are included in the quantities shown under *Energy industry use*. These gases and other fuels do not enter coke ovens or blast furnaces, but are used to heat the ovens and the blast air supplied to furnaces.

Chemicals

A.38 The petro-chemical industry uses hydrocarbon fuels (mostly oil products and gases) as feedstock for the manufacture of its products. Distinguishing the energy use of delivered fuels from their non-energy use is complicated by the absence of detailed information. The procedures adopted to estimate the use are described in paragraphs A.41 and A.42 under *Non energy use*.

Transport

A.39 Figures under this heading are almost entirely quantities used strictly for transport purposes. However, the figures recorded against road transport usually include some fuel that is actually consumed in some "off-road" activities. Similarly, figures for railway fuels include some amounts of burning oil not used directly for transport purposes. Transport sector use of electricity includes all electricity used in industries classified to SIC2003 Groups 60 to 63. Fuels supplied to cargo and passenger ships undertaking international voyages are reported as *Marine bunkers* (see paragraph A.13). Supplies to fishing vessels are included under "agriculture".

Other sectors

A.40 The classification of all consumers groups under this heading, except *domestic*, follows *SIC2003* and is described in Table 1E in Chapter 1. The consistency of the classification across

different commodities cannot be guaranteed because the figures reported are dependent on what the data suppliers can provide.

Non energy use

A.41 The non energy use of fuels may be divided into two types. They may be used directly for their physical properties e.g. lubricants or bitumen used for road surfaces, or by the petro-chemical industry as raw materials for the manufacture of goods such as plastics. In their use by the petro-chemical industry, relatively little combustion of the fuels takes place and the carbon and/or hydrogen they contain are largely transferred into the finished product. However, in some cases heat from the manufacturing process or from combustion of by-products may be used. Data for this energy use are rarely available. Depending on the feedstock, non energy consumption is either estimated or taken to be the deliveries to the chemicals sector.

A.42 Both types of non energy use are shown under the *Non energy use* heading at the foot of the balances.

The energy balance (Tables 1.1 to 1.3)

Principles

A.43 The energy balance conveniently presents:

- an overall view of the United Kingdom's energy supplies;
- the relative importance of each energy commodity;
- dependence on imports;
- the contribution of our own fossil and renewable resources;
- the interdependence of commodities on one another.

A.44 The energy balance is constructed directly from the commodity balances by expressing the data in a common unit, placing them beside one another and adding appropriate totals. Heat sold is also included as a fuel. However, some rearrangement of the commodity balance format is required to show transformation of primary into secondary commodities in an easily understood manner.

A.45 Energy units are widely used as the common unit, and the current practice for the United Kingdom and the international organisations which prepare balances is to use the tonne of oil equivalent or a larger multiple of this unit, commonly thousands. One tonne of oil equivalent is defined as 10^7 kilocalories (41.868 gigajoules). The tonne of oil equivalent is another unit of energy like the gigajoule, kilocalorie or kilowatt hour, rather than a physical quantity. It has been chosen as it is easier to visualise than the other units. Due to the natural variations in heating value of primary fuels such as crude oil, it is rare that one tonne of oil has an energy content equivalent to one tonne of oil equivalent, however it is generally within a few per cent of the heating value of a tonne of oil equivalent. The energy figures are calculated from the natural units of the commodity balances by multiplying by factors representing the calorific (heating) value of the fuel. The gross calorific values of fuels are used for this purpose. When the natural unit of the commodity is already an energy unit (electricity in kilowatt hours, for example) the factors are just constants, converting one energy unit to another.

A.46 Most of the underlying definitions and ideas of commodity balances can be taken directly over into the energy balance. However, production of secondary commodities and, in particular, electricity are treated differently and need some explanation. The components of the energy balance are described below, drawing out the differences of treatment compared with the commodity balances.

Primary supply

A.47 Within the energy balance, the production row covers only extraction of primary fuels and the generation of primary energy (hydro, nuclear, wind). Note the change of row heading from *Production* in the commodity balances to *Indigenous production* in the energy balance. Production of secondary fuels and secondary electricity are shown in the transformation sector and not in the indigenous production row at the top of the balance.

A.48 For fossil fuels, indigenous production represents the marketable quantity extracted from the reserves. Indigenous production of *Primary electricity* comprises hydro-electricity, wind and nuclear

energy. The energy value for hydro-electricity is taken to be the energy content of the electricity produced from the hydro power plant and not the energy available in the water driving the turbines. A similar approach is adopted for electricity from wind generators. The electricity is regarded as the primary energy form because there are currently no other uses of the energy resource “upstream” of the generation. The energy value attached to nuclear electricity is discussed in paragraph A.52.

A.49 The other elements of the supply part of the balance are identical to those in the commodity balances. In particular, the sign convention is identical, so that figures for exports and international marine bunkers carry negative signs. A stock build carries a negative sign to denote it as a withdrawal from supply whilst a stock draw carries a positive sign to show it as an addition to supply.

A.50 The *Primary supply* is the sum of the figures above it in the table, taking account of the signs, and expresses the national requirement for primary energy commodities from all sources and foreign supplies of secondary commodities. It is an indicator of the use of indigenous resources and external energy supplies. Both the amount and mixture of fuels in final consumption of energy commodities in the United Kingdom will differ from the primary supply. The “mix” of commodities in final consumption will be much more dependent on the manufacture of secondary commodities, in particular electricity.

Transformation

A.51 Within an energy balance the presentation of the inputs to and outputs from transformation activities requires special mention, as it is carried out using a compact format. The transformation sector also plays a key role in moving primary electricity from its own column in the balance into the electricity column, so that it can be combined with electricity from fossil fuelled power stations and the total disposals shown.

A.52 Indigenous production of primary electricity comprises nuclear electricity, hydro electricity and electricity from wind generation. Nuclear electricity is obtained by passing steam from nuclear reactors through conventional steam turbine sets. The heat in the steam is considered to be the primary energy available and its value is calculated from the electricity generated using the average thermal efficiency of nuclear stations, currently 37.9 in the United Kingdom. The electrical energy from hydro and wind is transferred from the *Primary electricity* column to the *Electricity* column using the *transfers* row because electricity is the form of primary energy and no transformation takes place. However, because the form of the nuclear energy is the steam from the nuclear reactors, the energy it contains is shown entering electricity generation and the corresponding electricity produced is included with all electricity generation in the figure, in the same row, under the *Electricity* column.

A.53 Quantities of fuels entering transformation activities (fuels into electricity generation and heat generation, crude oil into petroleum product manufacture (refineries), or coal into coke ovens) are shown with a negative sign to represent the input and the resulting production is shown as a positive number.

A.54 For electricity generated by Major power producers, the inputs are shown in the *Major power producers* row of the *coal, manufactured fuel, primary oils, petroleum products, gas, renewables* and *primary electricity* columns. The total energy input to electricity generation is the sum of the values in these first seven columns. The *Electricity* column shows total electricity generated from these inputs and the transformation loss is the sum of these two figures, given in the *Total* column.

A.55 Within the transformation sector, the negative figures in the *Total* column represent the losses in the various transformation activities. This is a convenient consequence of the sign convention chosen for the inputs and outputs from transformation. Any positive figures represent a transformation gain and, as such, are an indication of incorrect data.

A.56 In the energy balance, the columns containing the input commodities for electricity generation, heat generation and oil refining are separate from the columns for the outputs. However, for the transformation activities involving solid fuels this is only partly the case. Coal used for the manufacture of coke is shown in the coke manufacture row of the transformation section in the coal column, but the related coke and coke oven gas production are shown combined in the *Manufactured fuels* column. Similarly, the input of coke to blast furnaces and the resulting production of blast furnace gas are not identifiable and have been combined in the *Manufactured fuels* column in the

Blast furnace row. As a result, only the net loss from blast furnace transformation activity appears in the column.

A.57 The share of each commodity or commodity group in primary supply can be calculated from the table. This table also shows the demand for primary as well as foreign supplies. Shares of primary supplies may be taken from the *Primary supply* row of the balance. Shares of fuels in final consumption may be calculated from the final consumption row.

Energy industry use and final consumption

A.58 The figures for final consumption and energy industry use follow, in general, the principles and definitions described under commodity balances in paragraphs A.29 to A.42.

Standard conversion factors

1 tonne of oil equivalent (toe)	= 10 ⁷ kilocalories = 396.83 therms = 41.868 GJ = 11,630 kWh
100,000 British thermal units (Btu)	= 1 therm

This Digest follows UK statistical practice and uses the term "billion" to refer to one thousand million or 10⁹

The following prefixes are used for multiples of joules, watts and watt hours:

kilo (k)	= 1,000	or 10 ³
mega (M)	= 1,000,000	or 10 ⁶
giga (G)	= 1,000,000,000	or 10 ⁹
tera (T)	= 1,000,000,000,000	or 10 ¹²
peta (P)	= 1,000,000,000,000,000	or 10 ¹⁵

WEIGHT

1 kilogramme (kg)	= 2.2046 pounds (lb)
1 pound (lb)	= 0.4536 kg
1 tonne (t)	= 1,000kg = 0.9842 long ton = 1.102 short ton (sh tn)
1 Statute or long ton	= 2,240 lb = 1.016 t = 1.102 sh tn

LENGTH

1 mile	= 1.6093 kilometres
1 kilometre (km)	= 0.62137 miles

VOLUME

1 cubic metre (cu m)	= 35.31 cu ft
1 cubic foot (cu ft)	= 0.02832 cu m
1 litre	= 0.22 Imperial gallons (UK gal) = 8 UK pints = 1.201 US gallons (US gal) = 4.54609 litres
1 UK gallon	= 159.0 litres = 34.97 UK gal = 42 US gal
1 barrel	

TEMPERATURE

1 scale degree Celsius (C)	= 1.8 scale degrees Fahrenheit (F)
For conversion of temperatures: °C = 5/9 (°F -32); °F = 9/5 °C +32	

Average conversion factors for petroleum 2008

	Imperial gallons per tonne	Litres per tonne	Imperial gallons per tonne	Litres per tonne
Crude oil:			Gas/diesel oil:	
Indigenous	264	1,199	Gas oil	254 1,153
Imported	260	1,181	Marine diesel oil	254 1,153
Average of refining throughput	262	1,192		
			Fuel oil:	
Ethane	601	2,730	All grades	225 1,023
Propane	425	1,931	Light fuel oil:	
Butane	380	1,726	1% or less sulphur	234 1,065
Naphtha (l.d.f.)	315	1,429		
			Medium fuel oil:	
Aviation gasoline	311	1,414	1% or less sulphur	225 1,020
			Heavy fuel oil:	
Motor spirit:			1% or less sulphur	223 1,012
All grades	300	1,362		
Unleaded Super	298	1,354	Lubricating oils:	
Ultra low sulphur petrol	300	1,361	White	245 1,111
Lead replacement petrol	299	1,360	Greases	247 1,122
			Other	248 1,127
Middle distillate feedstock	210	952	Bitumen	216 983
Kerosene:			Petroleum coke	186 843
Aviation turbine fuel	275	1,249	Petroleum waxes	258 1,173
Burning oil	274	1,245	Industrial spirit	274 1,247
			White spirit	283 1,286
DERV fuel:				
0.005% or less sulphur	264	1,198		

Note: The above conversion factors, which for refined products have been compiled by the UK Petroleum Industry Association, apply to the year 2008, and are only approximate for other years.

Fuel conversion factors for converting fossil fuels to carbon dioxide, 2007

	kg CO ₂ per tonne	kg CO ₂ per kWh	kg CO ₂ per litre
Gases			
Natural Gas		0.184	
Liquid fuels			
LPG		0.214	1.495
Gas oil	3190	0.252	2.762
Fuel oil	3216	0.266	3.172*
Burning oil	3150	0.246	2.532
Naptha	3131	0.237	2.159*
Petrol	3135	0.240	2.303
Diesel	3164	0.250	2.639
Aviation spirit	3128	0.238	2.226
Aviation turbine fuel	3150	0.245	2.528
Solid fuels			
Industrial coal	2301	0.308	
Domestic coal	2506	0.296	
Coking coal	2931	0.346	

All emission factors are based on a Gross Calorific Value basis

*DECC estimates

The information above is based on the 2009 Greenhouse gas conversion factors for company reporting, available at: www.defra.gov.uk/environment/business/reporting/conversion-factors.htm. The information on this website also provide emission factors on a Net Calorific Basis.

The figures are derived by AEA based on data contained in the 2008 edition of this Digest, available at www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx, together with information from the National Atmospheric Emissions Inventory. More information on the Inventory is available at: www.naei.org.uk/reports.php. For liquid fuels, the "kg CO₂ per tonne" figure remains fairly constant on a year to year basis, so it is possible to derive "kg CO₂ per kWh" and "kg CO₂ per litre" figures for other years using the average conversion factors for petroleum data contained annually in Annex A of the Digest.

A.2 Estimated average gross calorific values of fuels 1980, 1990, 2000 and 2005 to 2008

	GJ per tonne (gross)						
	1980	1990	2000	2005	2006	2007	2008
Coal							
All consumers (1)(2)	25.6	25.5	26.2	25.8	25.7	26.3	26.1
All consumers - home produced plus imports minus exports (1)	..	..	27.0	26.9	26.8	27.0	26.9
Power stations (2)	23.8	24.8	25.6	25.0	25.0	25.3	25.4
Power stations - home produced plus imports (1)	..	..	26.0	26.1	26.2	26.2	26.2
Coke ovens (2)	30.5	30.2	31.2	32.5	32.3	32.8	32.6
Coke ovens - home produced plus imports (1)	..	..	30.4	30.5	30.5	30.5	30.5
Low temperature carbonisation plants and manufactured fuel plants	19.1	29.2	30.3	29.6	29.5	29.4	30.5
Collieries	27.0	28.6	29.6	29.8	30.0	29.8	29.7
Agriculture	30.1	28.9	29.2	28.0	28.0	28.0	28.0
Iron and steel industry (3)	29.1	28.9	30.7	30.4	30.4	30.4	30.4
Other industries (1)	27.1	27.8	26.7	26.6	26.6	27.2	27.0
Non-ferrous metals	..	23.1	25.1	24.5	25.0	25.4	25.4
Food, beverages and tobacco	28.6	28.1	29.5	29.8	29.0	30.4	30.4
Chemicals	25.8	27.3	28.7	26.6	26.7	26.7	26.7
Textiles, clothing, leather and footwear	27.5	27.7	30.4	29.5	29.6	29.5	29.5
Pulp, paper, printing, etc.	26.5	27.9	28.7	28.9	29.4	29.4	29.4
Mineral products (4)	..	28.2	27.0	27.6	27.6	27.6	27.6
Engineering (5)	27.7	28.3	29.3	30.7	30.4	29.5	29.5
Other industry (6)	28.4	28.5	30.2	25.9	25.5	28.5	26.1
Domestic							
House coal	30.1	30.2	30.9	30.7	30.5	30.5	30.5
Anthracite and dry steam coal	33.3	33.6	33.5	33.8	33.9	33.8	34.7
Other consumers	27.5	27.5	29.2	29.1	29.6	29.6	29.6
Imported coal (1)	..	28.3	28.0	27.3	27.2	27.3	27.3
of which Steam coal	..	..	26.6	26.6	26.5	26.5	26.5
Coking coal	..	..	30.4	30.4	30.4	30.4	30.4
Anthracite	..	..	31.2	30.4	31.4	33.2	33.2
Exports (1)	..	29.0	32.0	32.7	32.5	32.6	33.0
of which Steam coal	..	..	31.0	32.9	32.2	32.2	32.2
Anthracite	..	..	32.6	32.6	32.5	32.6	33.0
Coke (7)	28.1	28.1	29.8	29.8	29.8	29.8	29.8
Coke breeze	24.4	24.8	24.8	24.8	24.8	24.8	24.8
Other manufactured solid fuels (1)	27.6	27.6	30.8	32.5	32.5	32.5	32.6
Petroleum							
Crude oil (1)	45.2	45.6	45.7	45.7	45.7	45.7	45.7
Liquified petroleum gas	49.6	49.4	49.4	49.5	49.5	49.5	49.3
Ethane	52.3	50.6	50.7	50.7	50.7	50.7	50.7
LDF for gasworks/Naphtha	47.8	47.9	47.7	47.6	47.5	47.7	47.7
Aviation spirit and wide-cut gasoline (AVGAS and AVTAG)	47.2	47.3	47.3	47.4	47.4	47.4	47.4
Aviation turbine fuel (AVTUR)	46.4	46.2	46.2	46.2	46.2	46.2	46.2
Motor spirit	47.0	47.0	47.0	47.0	47.1	47.1	47.1
Burning oil	46.5	46.2	46.2	46.2	46.2	46.2	46.2
Vaporising oil	45.9	45.9	..	..	..	..	..
Gas/diesel oil (including DERV)	45.5	45.4	45.6	45.7	45.6	45.5	45.5
Fuel oil	42.8	43.2	43.1	43.5	43.3	43.6	43.6
Power station oil	42.8	43.2	43.1	43.5	43.3	43.6	43.6
Non-fuel products (notional value)	42.2	43.2	43.8	42.9	43.1	43.2	43.1
Petroleum coke	..	39.5	35.8	35.8	35.8	35.7	35.8
Natural Gas (8)	..	38.4	39.4	39.6	39.8	39.7	39.7

(1) Weighted averages.

(2) Home produced coal only.

(3) From 2001 onwards almost entirely sourced from imports.

(4) Based on information provided by the British Cement Industry Association; almost all coal used by this sector in the latest 4 years was imported.

(5) Mechanical engineering and metal products, electrical and instrument engineering and vehicle manufacture.

(6) Includes construction.

(7) Since 1995 the source of these figures has been the ISSB.

(8) Natural Gas figures are shown in MJ per cubic metre

(9) Net calorific values have been revised back to 1980 in accordance with revised assumptions.

A.3 Estimated average net calorific values of fuels 1980, 1990, 2000 and 2005 to 2008

GJ per tonne (net)

	1980	1990	2000	2005	2006	2007	2008
Coal							
All consumers (1)(2)	24.3	24.2	24.9	24.5	24.4	25.0	24.8
All consumers - home produced plus imports minus exports (1)	..	..	25.7	25.6	25.5	25.7	25.6
Power stations (2)	22.6	23.6	24.3	23.8	23.8	24.0	24.1
Power stations - home produced plus imports (1)	..	..	24.7	24.8	24.9	24.9	24.9
Coke ovens (2)	29.0	28.7	29.6	30.9	30.7	31.2	31.0
Coke ovens - home produced plus imports (1)	..	..	28.9	29.0	29.0	29.0	29.0
Low temperature carbonisation plants and manufactured fuel plants	18.1	27.7	28.8	28.1	28.0	27.9	29.0
Collieries	25.7	27.2	28.1	28.3	28.5	28.3	28.2
Agriculture	28.6	27.5	27.7	26.6	26.6	26.6	26.6
Iron and steel industry (3)	27.6	27.5	29.2	28.9	28.9	28.9	28.9
Other industries (1)	25.7	26.4	25.4	25.3	25.3	25.8	25.7
Non-ferrous metals	..	21.9	23.8	23.3	23.8	24.1	24.1
Food, beverages and tobacco	27.2	26.7	28.0	28.3	27.6	28.9	28.9
Chemicals	24.5	25.9	27.3	25.3	25.4	25.4	25.4
Textiles, clothing, leather and footwear	26.1	26.3	28.9	28.0	28.1	28.0	28.0
Pulp, paper, printing, etc.	25.2	26.5	27.3	27.5	27.9	27.9	27.9
Mineral products (4)	..	26.8	25.7	26.2	26.2	26.2	26.2
Engineering (5)	26.3	26.9	27.8	29.2	28.9	28.0	28.0
Other industry (6)	27.0	27.1	28.7	24.6	24.2	27.1	24.8
Domestic							
House coal	28.6	28.7	29.4	29.2	29.0	29.0	29.0
Anthracite and dry steam coal	31.6	31.9	31.8	32.1	32.2	32.1	33.0
Other consumers	26.1	26.1	27.7	27.6	28.1	28.1	28.1
Imported coal (1)	..	26.9	26.6	25.9	25.8	25.9	25.9
of which							
Steam coal	..	..	25.3	25.3	25.2	25.2	25.2
Coking coal	..	..	28.9	28.9	28.9	28.9	28.9
Anthracite	..	..	29.6	28.9	29.8	31.5	31.5
Exports (1)	..	27.6	30.4	31.1	30.9	31.0	31.4
of which							
Steam coal	..	..	29.5	31.3	30.6	30.6	30.6
Anthracite	..	..	31.0	31.0	30.9	31.0	31.4
Coke (7)	28.1	28.1	29.8	29.8	29.8	29.8	29.8
Coke breeze	24.4	24.8	24.8	24.8	24.8	24.8	24.8
Other manufactured solid fuels (1)	26.2	26.2	29.3	30.9	30.9	30.9	31.0
Petroleum							
Crude oil (1)	42.9	43.3	43.4	43.4	43.4	43.4	43.4
Liquified petroleum gas (9)	46.2	46.0	46.0	45.9	45.9	45.9	45.9
Ethane (9)	48.1	46.6	46.6	46.6	46.6	46.6	46.6
LDF for gasworks/Naphtha	45.4	45.5	45.3	45.2	45.1	45.3	45.3
Aviation spirit and wide-cut gasoline (AVGAS and AVTAG)	44.8	44.9	44.9	45.0	45.0	45.0	45.0
Aviation turbine fuel (AVTUR)	44.1	43.9	43.9	43.9	43.9	43.9	43.9
Motor spirit	44.7	44.7	44.7	44.7	44.7	44.7	44.7
Burning oil	44.2	43.9	43.9	43.9	43.9	43.9	43.9
Vaporising oil	43.6	43.6	..	..	..	..	..
Gas/diesel oil (including DERV) (9)	42.8	42.7	42.9	42.9	42.9	42.8	42.8
Fuel oil (9)	40.2	40.6	40.5	40.9	40.7	41.0	41.0
Power station oil (9)	40.2	40.6	40.5	40.9	40.7	41.0	41.0
Non-fuel products (notional value)	40.1	41.0	41.6	40.8	40.9	41.1	40.9
Petroleum coke	..	37.5	34.0	34.0	34.0	33.9	34.0
Natural Gas (8)	-	34.6	35.5	35.6	35.8	35.7	35.7

For footnotes see table A.2

The net calorific values of natural gas and coke oven gas are the gross calorific values x 0.9.



Annex B

Glossary and Acronyms

Advanced gas-cooled reactor (AGR)	A type of nuclear reactor cooled by carbon dioxide gas.
AEA Energy & Environment	Part of the AEA Group, comprising the former Future Energy Solutions and NETCEN.
AES	Association of Electricity Supplies
Anthracite	Within this publication, anthracite is coal classified as such by UK coal producers and importers of coal. Typically it has a high heat content making it particularly suitable for certain industrial processes and for use as a domestic fuel.
Anthropogenic	Produced by human activities.
Associated Gas	Natural gas found in association with crude oil in a reservoir, either dissolved in the oil or as a cap above the oil.
Autogeneration	Generation of electricity by companies whose main business is not electricity generation, the electricity being produced mainly for that company's own use.
Aviation spirit	A light hydrocarbon oil product used to power piston-engined aircraft power units.
Aviation turbine fuel	The main aviation fuel used for powering aviation gas-turbine power units (jet aircraft engine).
BE	British Energy
Benzole	A colourless liquid, flammable, aromatic hydrocarbon by-product of the iron and steel making process. It is used as a solvent in the manufacture of styrenes and phenols but is also used as a motor fuel.
BERR	Department for Business, Enterprise and Regulatory Reform
BETTA	British Electricity Trading and Transmission Arrangements (BETTA) refer to changes to electricity generation, distribution and supply licences. On 1 April 2005, the England and Wales trading arrangements were extended to Scotland by the British Electricity Trading and Transmission Arrangements creating a single GB market for trading of wholesale electricity, with common arrangements for access to and use of GB transmission system. From 1 April 2005, NGC has become the System Operator for the whole of GB. BETTA replaced NETA (see page 234) on 4 April 2005.
Biodiesel	(FAME - biodiesel produced to BS EN 14214). Produced from vegetable oils or animal fats by mixing them with ethanol or methanol to break them down.
Bioethanol	Created from crops rich in starch or sugar by fermentation, distillation and finally dehydration.

Biogas	Energy produced from the anaerobic digestion of sewage and industrial waste.
Bitumen	The residue left after the production of lubricating oil distillates and vacuum gas oil for upgrading plant feedstock. Used mainly for road making and construction purposes.
Blast furnace gas	Mainly produced and consumed within the iron and steel industry. Obtained as a by-product of iron making in a blast furnace, it is recovered on leaving the furnace and used partly within the plant and partly in other steel industry processes or in power plants equipped to burn it. A similar gas is obtained when steel is made in basic oxygen steel converters; this gas is recovered and used in the same way.
Breeze	Breeze can generally be described as coke screened below 19 mm ($\frac{3}{4}$ inch) with no fines removed but the screen size may vary in different areas and to meet the requirements of particular markets.
BG	British Gas
BOS	Basic Oxygen Steel furnace gas
BNFL	British Nuclear Fuels plc.
BRE	Building Research Establishment
Burning oil	A refined petroleum product, with a volatility in between that of motor spirit and gas diesel oil primarily used for heating and lighting.
Butane	Hydrocarbon (C ₄ H ₁₀), gaseous at normal temperature but generally stored and transported as a liquid. Used as a component in Motor Spirit to improve combustion, and for cooking and heating (see LPG).
Calorific values (CVs)	The energy content of a fuel can be measured as the heat released on complete combustion. The SI (Système International - see page 236) derived unit of energy and heat is the Joule. This is the energy per unit volume of the fuel and is often measured in GJ per tonne. The energy content can be expressed as an upper (or gross) value and a lower (or net) value. The difference between the two values is due to the release of energy from the condensation of water in the products of combustion. Gross calorific values are used throughout this publication.
CCA	Climate Change Agreement. Climate Change Agreements allow energy intensive business users to receive an 80 per cent discount from the Climate Change Levy (CCL), in return for meeting energy efficiency or carbon saving targets. The CCL is a tax on the use of energy in industry, commerce and the public sector. The aim of the levy is to encourage users to improve energy efficiency and reduce emissions of greenhouse gases.
CCL	Climate Change Levy. The Climate Change Levy is a tax on the use of energy in industry, commerce and the public sector, with offsetting cuts in employers' National Insurance Contributions and additional support for energy efficiency schemes and renewable sources of energy. The aim of the levy is to encourage users to improve energy efficiency and reduce emissions of greenhouse gases.

CO₂	Carbon dioxide. Carbon dioxide contributes about 60 per cent of the potential global warming effect of man-made emissions of greenhouse gases. Although this gas is naturally emitted by living organisms, these emissions are offset by the uptake of carbon dioxide by plants during photosynthesis; they therefore tend to have no net effect on atmospheric concentrations. The burning of fossil fuels, however, releases carbon dioxide fixed by plants many millions of years ago, and thus increases its concentration in the atmosphere.
Co-firing	The burning of biomass products in fossil fuel power stations
Coke oven coke	The solid product obtained from carbonisation of coal, principally coking coal, at high temperature, it is low in moisture and volatile matter. Used mainly in iron and steel industry.
Coke oven gas	Gas produced as a by-product of solid fuel carbonisation and gasification at coke ovens, but not from low temperature carbonisation plants. Synthetic coke oven gas is mainly natural gas which is mixed with smaller amounts of blast furnace and basic oxygen steel furnace gas to produce a gas with almost the same quantities as coke oven gas.
Coking coal	Within this publication, coking coal is coal sold by producers for use in coke ovens and similar carbonising processes. The definition is not therefore determined by the calorific value or caking qualities of each batch of coal sold, although calorific values tend to be higher than for steam coal. Not all coals form cokes. For a coal to coke it must exhibit softening and agglomeration properties, ie the end product must be a coherent solid.
Colliery methane	Methane released from coal seams in deep mines which is piped to the surface and consumed at the colliery or transmitted by pipeline to consumers.
Combined cycle gas Turbine (CCGT)	Combined cycle gas turbine power stations combine gas turbines and steam turbines which are connected to one or more electrical generators in the same plant. The gas turbine (usually fuelled by natural gas or oil) produces mechanical power (to drive the generator) and heat in the form of hot exhaust gases. These gases are fed to a boiler, where steam is raised at pressure to drive a conventional steam turbine, which is also connected, to an electrical generator.
Combined Heat and Power (CHP)	CHP is the simultaneous generation of usable heat and power (usually electricity) in a single process. The term CHP is synonymous with cogeneration and total energy, which are terms often used in the United States or other Member States of the European Community. The basic elements of a CHP plant comprise one or more prime movers driving electrical generators, where the steam or hot water generated in the process is utilised via suitable heat recovery equipment for use either in industrial processes, or in community heating and space heating. For further information see Chapter 6 paragraph 6.33.
CHPQA	Combined Heat and Power Quality Assurance Scheme
Conventional thermal power stations	These are stations which generate electricity by burning fossil fuels to produce heat to convert water into steam, which then powers steam turbines.

Cracking/conversion	A refining process using combinations of temperature, pressure and in some cases a catalyst to produce petroleum products by changing the composition of a fraction of petroleum, either by splitting existing longer carbon chain or combining shorter carbon chain components of crude oil or other refinery feedstock's. Cracking allows refiners to selectively increase the yield of specific fractions from any given input petroleum mix depending on their requirements in terms of output products.
CRC	Carbon Reduction Commitment. The Carbon Reduction Commitment is a proposed mandatory cap and trade scheme that will apply to large non energy-intensive organisations in the public and private sectors. It is anticipated that the scheme will have cut carbon emissions by 1.2 million tonnes of carbon per year by 2020.
Crude oil	A mineral oil consisting of a mixture of hydrocarbons of natural origins, yellow to black in colour, of variable density and viscosity.
DECC	Department of Energy and Climate Change
DEFRA	Department for Environment, Food and Rural Affairs
DERV	Diesel engined road vehicle fuel used in internal combustion engines that are compression-ignited (see gas diesel oil on page 232).
DFT	Department for Transport
Distillation	A process of separation of the various components of crude oil and refinery feedstocks using the different temperatures of evaporation and condensation of the different components of the mix received at the refineries.
DNC	Declared net capacity and capability are used to measure the maximum power available from generating stations at a point in time. See Chapter 5 paragraphs 5.63 and 5.64 and Chapter 7 paragraph 7.68 for a fuller definition.
DNO	Distribution Network Operator
Downstream	Used in oil and gas processes to cover the part of the industry after the production of the oil and gas. For example, it covers refining, supply and trading, marketing and exporting.
DTI	Department of Trade and Industry
DUKES	Digest of United Kingdom Energy Statistics, the Digest provides essential information for everyone, from economists to environmentalists and from energy suppliers to energy users.
ECA	Enhanced Capital Allowances
EHCS	English House Condition Survey

Embedded Generation	Embedded generation is electricity generation by plant which has been connected to the distribution networks of the public electricity distributors rather than directly to the National Grid Company's transmission systems. Typically they are either smaller stations located on industrial sites, or combined heat and power plant, or renewable energy plant such as wind farms, or refuse burner generators. The category also includes some domestic generators such as those with electric solar panels. For a description of the current structure of the electricity industry in the UK see Chapter 5 paragraphs 5.48 to 5.53.
Energy use	Energy use of fuel mainly comprises use for lighting, heating or cooling, motive power and power for appliances. See also non-energy use on page 234.
ESA	European System of National and Regional Accounts. An integrated system of economic accounts which is the European version of the System of National Accounts (SNA).
EESs	The Energy Efficiency Commitment (formerly known as Energy Efficiency Standards of Performance) is an obligation placed on all energy suppliers to offer help and advice to their customers to improve the energy efficiency of their homes.
Ethane	A light hydrocarbon gas (C ₂ H ₆) in natural gas and refinery gas streams (see LPG).
EU-ETS	European Union Emissions Trading Scheme. This began on 1 st January 2005 and involves the trading of emissions allowances as means of reducing emissions by a fixed amount.
EUROSTAT	Statistical Office of the European Communities (SOEC).
Exports	For some parts of the energy industry, statistics on trade in energy related products can be derived from two separate sources. Firstly, figures can be reported by companies as part of systems for collecting data on specific parts of the energy industry (eg as part of the system for recording the production and disposals of oil from the UK continental shelf). Secondly, figures are also available from the general systems that exist for monitoring trade in all types of products operated by HM Revenue and Customs.
FES	Future Energy Solutions, now known as AEA Energy & Environment, part of the AEA Group.
Feedstock	In the refining industry, a product or a combination of products derived from crude oil, destined for further processing other than blending. It is distinguished from use as a chemical feedstock etc. See non-energy use on page 234.
Final energy consumption	Energy consumption by final user – ie which is not being used for transformation into other forms of energy.
Fossil fuels	Coal, natural gas and fuels derived from crude oil (for example petrol and diesel) are called fossil fuels because they have been formed over long periods of time from ancient organic matter.

Fuel oils	The heavy oils from the refining process; used as fuel in furnaces and boilers of power stations, industry, in domestic and industrial heating, ships, locomotives, metallurgic operations, and industrial power plants etc.
Fuel oil - Light	Fuel oil made up of heavier straight-run or cracked distillates and used in commercial or industrial burner installations not equipped with pre-heating facilities.
Fuel oil - Medium	Other fuel oils, sometimes referred to as bunker fuels, which generally require pre-heating before being burned, but in certain climatic conditions do not require pre-heating.
Fuel oil - Heavy	Other heavier grade fuel oils which in all situations require some form of pre-heating before being burned.
Fuel poverty	The common definition of a fuel poor household is one needing to spend in excess of 10 per cent of household income to achieve a satisfactory heating regime (21°C in the living room and 18°C in the other occupied rooms).
Gas Diesel Oil	The medium oil from the refinery process; used as a fuel in diesel engines (ie internal combustion engines that are compression-ignited), burned in central heating systems and used as a feedstock for the chemical industry.
GDP	Gross Domestic Product.
GDP deflator	An index of the ratio of GDP at current prices to GDP at constant prices. It provides a measure of general price inflation within the whole economy.
Gigajoule (GJ)	A unit of energy equal to 10 ⁹ joules (see note on joules on page 221).
Gigawatt (GW)	A unit of electrical power, equal to 10 ⁹ watts.
Heat sold	Heat (or steam) that is produced and sold under the provision of a contract. Heat sold is derived from heat generated by Combined Heat and Power (CHP) plants and from community heating schemes without CHP plants.
HMRC	HM Revenue and Customs.
Imports	See the entry for exports on page 231. Before the 1997 edition of the Digest, the term "arrivals" was used to distinguish figures derived from the former source from those import figures derived from the systems operated by HM Revenue and Customs. To make it clearer for users, a single term is now being used for both these sources of figures (the term imports) as this more clearly states what the figures relate to, which is goods entering the UK.
International Energy Agency (IEA)	The IEA is an autonomous body located in Paris which was established in November 1974 within the framework of the Organisation for Economic Co-operation and Development (OECD) to implement an international energy programme.
Indigenous production	For oil this includes production from the UK Continental Shelf both onshore and offshore.

Industrial spirit	Refined petroleum fractions with boiling ranges up to 200°C dependent on the use to which they are put – eg seed extraction, rubber solvents, perfume etc.
ISSB	Iron and Steel Statistics Bureau
ITF	Industry Technology Facilitator
Joules	A joule is a generic unit of energy in the conventional SI system (see note on page 236). It is equal to the energy dissipated by an electrical current of 1 ampere driven by 1 volt for 1 second; it is also equal to twice the energy of motion in a mass of 1 kilogram moving at 1 metre per second.
Kilowatt (kW)	1,000 watts
Landfill gas	The methane-rich biogas formed from the decomposition of organic material in landfill.
LDF	Light distillate feedstock
LDZ	Local distribution zone
Liquefied natural Gas (LNG)	Natural gas that has been converted to liquid form for ease of storage or transport.
Liquefied petroleum Gas (LPG)	Gas usually propane or butane, derived from oil and put under pressure so that it is in liquid form. Often used to power portable cooking stoves or heaters and to fuel some types of vehicle, eg some specially adapted road vehicles, forklift trucks.
Lead Replacement Petrol (LRP)	An alternative to Leaded Petrol containing a different additive to lead (in the UK usually potassium based) to perform the lubrication functions of lead additives in reducing engine wear.
Lubricating oils	Refined heavy distillates obtained from the vacuum distillation of petroleum residues. Includes liquid and solid hydrocarbons sold by the lubricating oil trade, either alone or blended with fixed oils, metallic soaps and other organic and/or inorganic bodies.
Magnox	A type of gas-cooled nuclear fission reactor developed in the UK, so called because of the magnesium alloy used to clad the uranium fuel.
Major power producers	Companies whose prime purpose is the generation of electricity (paragraph 5.51 of Chapter 5 gives a full list of major power producers).
Megawatt (MW)	1,000 kilowatts. MWe is used to emphasise when electricity is being measured. MWt is used when heat (“thermal”) is being measured.
Micro CHP	Micro CHP is a new technology that is expected to make a significant contribution to domestic energy efficiency in the future.
MMC	Monopolies and Mergers Commission
Motor spirit	Blended light petroleum product used as a fuel in spark-ignition internal combustion engines (other than aircraft engines).
NAEI	National Atmospheric Emissions Inventory

National Allocation Plan (NAP)	Under the EU Emissions Trading Scheme (EU-ETS) Directive each EU country must have a National Allocation Plan which lays down the overall contribution of the EU-ETS participants (the “cap”) for the country and the allowances that each sector and each individual installation covered under the Directive is allocate, effectively stating how much that sector can emit over the trading period of the scheme
Naphtha	(Light distillate feedstock) – Petroleum distillate boiling predominantly below 200°C.
Natural gas	Natural gas is a mixture of naturally occurring gases found either in isolation, or associated with crude oil, in underground reservoirs. The main component is methane; ethane, propane, butane, hydrogen sulphide and carbon dioxide may also be present, but these are mostly removed at or near the well head in gas processing plants.
Natural gas - compressed	Natural gas that has been compressed to reduce the volume it occupies to make it easier to transport other than in pipelines. Whilst other petroleum gases can be compressed such that they move into liquid form, the volatility of natural gas is such that liquefaction cannot be achieved without very high pressures and low temperatures being used. As such, the compressed form is usually used as a “half-way house”.
Natural gas liquids (NGLs)	A mixture of liquids derived from natural gas and crude oil during the production process, including propane, butane, ethane and gasoline components (pentanes plus).
NDA	Nuclear Decommissioning Authority
NETA	New Electricity Trading Arrangements - In England and Wales these arrangements replaced “the pool” from 27 March 2001. The arrangements are based on bi-lateral trading between generators, suppliers, traders and customers and are designed to be more efficient, and provide more market choice.
NETCEN	National Environment Technology Centre, now known as AEA Energy & Environment, part of the AEA Group.
NIE	Northern Ireland Electricity
NI NFFO	Northern Ireland Non Fossil Fuel Obligation
Non-energy use	Includes fuel used for chemical feedstock, solvents, lubricants, and road making material.
NFFO	Non Fossil Fuel Obligation. The 1989 Electricity Act empowers the Secretary of State to make orders requiring the Regional Electricity Companies in England and Wales to secure specified amounts of electricity from renewable sources.
NFPA	Non Fossil Purchasing Agency
NO_x	Nitrogen oxides. A number of nitrogen compounds including nitrogen dioxide are formed in combustion processes when nitrogen in the air or the fuel combines with oxygen. These compounds can add to the natural acidity of rainfall.
NSCP	National Statistics Code of Practice
NUTS	Nonmenclature of Units for Territorial Statistics

OFGEM	The regulatory office for gas and electricity markets
OFT	Office of Fair Trading
Orimulsion	An emulsion of bitumen in water that was used as a fuel in some power stations until 1997.
ONS	Office for National Statistics
OTS	Overseas Trade Statistics of the United Kingdom
OXERA	Oxford Economic Research Association Ltd
Patent fuel	A composition fuel manufactured from coal fines by shaping with the addition of a binding agent (typically pitch). The term manufactured solid fuel is also used.
Petrochemical feedstock	All petroleum products intended for use in the manufacture of petroleum chemicals. This includes middle distillate feedstock of which there are several grades depending on viscosity. The boiling point ranges between 200°C and 400°C.
Petroleum cokes	Carbonaceous material derived from hydrocarbon oils, uses for which include metallurgical electrode manufacture and in the manufacture of cement.
PILOT	Phase 2 (PILOT) is the successor body to the Oil & Gas Industry Task Force (OGITF) and was established on 1 January 2000, to secure the long-term future of the oil and gas industry in the UK. A forum that brings together Government and industry to address the challenges facing the oil and gas industry. One outcome of PILOT's work is the published Code of Practice on Supply Chain Relationships.
Photovoltaics	The direct conversion of solar radiation into electricity by the interaction of light with the electrons in a semiconductor device or cell.
Plant capacity	The maximum power available from a power station at a point in time (see also Chapter 5 paragraph 5.63).
Plant loads, demands and efficiency	Measures of how intensively and efficiently power stations are being used. These terms are defined in Chapter 5 paragraphs 5.65 and 5.66.
PPRS	Petroleum production reporting system. Licensees operating in the UK Continental Shelf are required to make monthly returns on their production of hydrocarbons (oil and gas) to DECC. This information is recorded in the PPRS, which is used to report flows, stocks and uses of hydrocarbon from the well-head through to final disposal from a pipeline or terminal (see DUKES internet annex F on the energy statistics web site for further information).
Process oils	Partially processed feedstocks which require further processing before being classified as a finished product suitable for sale. They can also be used as a reaction medium in the production process.
Primary fuels	Fuels obtained directly from natural sources, eg coal, oil and natural gas.

Primary electricity	Electricity obtained other than from fossil fuel sources, eg nuclear, hydro and other non-thermal renewables. Imports of electricity are also included.
Propane	Hydrocarbon containing three carbon atoms (C ₃ H ₈), gaseous at normal temperature, but generally stored and transported under pressure as a liquid.
PWR	Pressurised water reactor. A nuclear fission reactor cooled by ordinary water kept from boiling by containment under high pressure.
Reforming	Processes by which the molecular structure of different fractions of petroleum can be modified. It usually involves some form of catalyst, most often platinum, and allows the conversion of lower grades of petroleum product into higher grades, improving their octane rating. It is a generic term for processes such as cracking, cyclization, dehydrogenation and isomerisation. These processes generally led to the production of hydrogen as a by-product, which can be used in the refineries in some desulphurization procedures.
Refinery fuel	Petroleum products produced by the refining process that are used as fuel at refineries.
Renewable energy sources	Renewable energy includes solar power, wind, wave and tide, and hydroelectricity. Solid renewable energy sources consist of wood, straw, short rotation coppice, other biomass and the biodegradable fraction of wastes. Gaseous renewables consist of landfill gas and sewage gas. Non-biodegradable wastes are not counted as a renewables source but appear in the Renewable sources of energy chapter of this Digest for completeness.
Reserves	With oil and gas these relate to the quantities identified as being present in underground cavities. The actual amounts that can be recovered depend on the level of technology available and existing economic situations. These continually change; hence the level of the UK's reserves can change quite independently of whether or not new reserves have been identified.
RD	Renewables Directive – this proposes that EU Member States adopt national targets that are consistent with the overall EU target of 12 per cent of energy (22.1 per cent of electricity) from renewables by 2010.
RESTATS	The Renewable Energy Statistics System
RO	Renewables Obligation – this is an obligation on all electricity suppliers to supply a specific proportion of electricity from eligible renewable sources.
ROCs	Renewables Obligation Certificates
SEPN	Sustainable Energy Policy Network represents the body of people responsible for delivering the white paper directly or indirectly through having links to business and other organisations nationally and regionally.
SI (Système International)	Refers to the agreed conventions for the measurement of physical quantities.

SIC	Standard Industrial Classification in the UK. Last revised in 2003 and known as SIC(2003), replaced previous classifications SIC(92), SIC(80) and SIC(68). SIC(92) was compatible with European Union classification NACE Rev1 (Nomenclature générale des activités économiques dans les Communautés européennes as revised in October 1990) and similarly SIC(2003) is consistent with NACE Rev1.1 which came into effect in January 2003. Classification systems need to be periodically revised because over time new products, processes and industries emerge.
Secondary fuels	Fuels derived from natural primary sources of energy. For example electricity generated from burning coal, gas or oil is a secondary fuel, as are coke and coke oven gas.
Steam coal	Within this publication, steam coal is coal classified as such by UK coal producers and by importers of coal. It tends to be coal having lower calorific values; the type of coal that is typically used for steam raising.
SO₂	Sulphur Dioxide. Sulphur dioxide is a gas produced by the combustion of sulphur-containing fuels such as coal and oil.
SOEC	Statistical Office of the European Communities
SRO	Scottish Renewable Orders
Synthetic coke oven gas	Mainly a natural gas, which is mixed with smaller amounts of blast furnace, and BOS (basic oxygen steel furnace) gas to produce a gas with almost the same quantities as coke oven gas.
Temperature correction	The temperature corrected series of total inland fuel consumption indicates what annual consumption might have been if the average temperature during the year had been the same as the average for the years 1961 to 1990.
Terawatt (TW)	1,000 gigawatts
TWh	Terawatt Hour
Thermal Sources of Electricity	These include coal, oil, natural gas, nuclear, landfill gas, sewage gas, municipal solid waste, farm waste, tyres, poultry litter, short rotation coppice, straw, coke oven gas, blast furnace gas, and waste products from chemical processes.
Tonne of oil equivalent (toe)	A common unit of measurement which enables different fuels to be compared and aggregated. (See Chapter 1 paragraphs 1.26 to 1.27 for further information and Annex A page 221 for conversion factors).
Tars	Viscous materials usually derived from the destructive distillation of coal which are by-products of the coke and iron making processes.
Therm	A common unit of measurement similar to a tonne of oil equivalent which enables different fuels to be compared and aggregated. (see Annex A).

Thermal efficiency	The thermal efficiency of a power station is the efficiency with which heat energy contained in fuel is converted into electrical energy. It is calculated for fossil fuel burning stations by expressing electricity generated as a percentage of the total energy content of the fuel consumed (based on average gross calorific values). For nuclear stations it is calculated using the quantity of heat released as a result of fission of the nuclear fuel inside the reactor.
UKCS	United Kingdom Continental Shelf
UKOOA	United Kingdom Offshore Operators Association
UKPIA	UK Petroleum Industry Association. The trade association for the UK petroleum industry.
UKSA	UK Statistics Authority
Ultra low sulphur Diesel (ULSD)	A grade of diesel fuel which has a much lower sulphur content (less than 0.005 per cent or 50 parts per million) and of a slightly higher volatility than ordinary diesel fuels. As a result it produces fewer emissions when burned. As such it enjoys a lower rate of excise duty in the UK than ordinary diesel (by 3 pence per litre) to promote its use. Virtually 100 per cent of sales of DERV fuel in the UK are ULSD.
Ultra low sulphur Petrol (ULSP)	A grade of motor spirit with a similar level of sulphur to ULSD (less than 0.005 per cent or 50 parts per million). In the March 2000 Budget it was announced that a lower rate of excise duty than ordinary petrol for this fuel would be introduced during 2000, which was increased to 3 pence per litre in the March 2001 Budget. It has quickly replaced ordinary premium grade unleaded petrol in the UK market place.
Upstream	A term to cover the activities related to the exploration, production and delivery to a terminal or other facility of oil or gas for export or onward shipment within the UK.
USBS	United States Bureau of Standards refers to legislation that sets minimum safety standards in the coal market and mining industry.
VAT	Value added tax
Watt (W)	The conventional unit to measure a rate of flow of energy. One watt amounts to 1 joule per second.
White spirit	A highly refined distillate with a boiling range of about 150°C to 200°C used as a paint solvent and for dry cleaning purposes etc.

Annex C

Further sources of United Kingdom energy publications

Some of the publications listed below give shorter term statistics, some provide further information about energy production and consumption in the United Kingdom and in other countries, and others provide more detail on a country or fuel industry basis. The list also covers recent publications on energy issues and policy, including statistical information, produced or commissioned by DECC. The list is not exhaustive and the titles of publications and publishers may alter. Unless otherwise stated, all titles are available from

Publications Orderline

Web: www.berr.gov.uk/publications

Phone: 0845 015 0010

Address: ADMAIL 528, London SW1W 0YT

Email: publications@bis.gsi.gov.uk

and can also be found on the DECC web site at www.decc.gov.uk/.

Department of Energy and Climate Change publications on energy

Energy Statistics

Monthly, quarterly and annual statistics on production and consumption of overall energy and individual fuels in the United Kingdom together with energy prices is available in MS Excel format on the Internet at: www.decc.gov.uk/en/content/cms/statistics/source/source.aspx

Energy Trends

A quarterly publication covering all major aspects of energy. It provides a comprehensive picture of energy production and use and contains analysis of data and articles covering energy issues. Available on subscription, with Quarterly Energy Prices (see below). Annual subscriptions run from June to March and are available at £40 to UK subscribers from Amey Plc, 7th Floor, Clarence House, Clarence Place, Newport, Wales NP19 7AA, Tel. 01633 224712. A subscription form is available at: www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx. An electronic version of the latest nine editions can be found at the same address. Single copies are available from the Publications Orderline priced at £6.

Quarterly Energy Prices

A quarterly publication containing tables, charts and commentary covering energy prices to domestic and industrial consumers for all the major fuels as well as presenting comparisons of fuel prices in the European Union and G7 countries. Available on subscription, with Energy Trends, (details given above). An electronic version of the latest nine editions can be found at www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx. Single copies are available from the Publications Orderline priced at £8.

UK Energy in Brief

An annual publication summarising the latest statistics on energy production, consumption and prices in the United Kingdom. The figures are taken from "Digest of UK Energy Statistics". Available free from DECC, Energy Statistics Team, 3rd Floor, Area E, 3 Whitehall Place, London SW1A 2HD, tel. 0300 068 5056 and from the Publications Orderline. It is also available on the Internet at: www.decc.gov.uk/en/content/cms/statistics/publications/brief/brief.aspx

Energy Flow Chart

An annual publication illustrating the flow of primary fuels from home production and imports to their eventual final uses. They are shown in their original state and after being converted into different kinds of energy by the secondary fuel producers. The 2009 edition of the chart shows the flows for 2008. Available free from DECC, Energy Statistics Team, 3rd Floor, Area E, 3 Whitehall Place, London SW1A 2HD, tel. 0300 068 5056 and from the Publications Orderline. It is also available on the Internet at: www.decc.gov.uk/en/content/cms/statistics/publications/flow/flow.aspx

UK Energy Sector Indicators

An annual publication designed to show in headline form the progress that has been made in implementing the four key energy policy goals as set out in the 2003 Energy White Paper, and reiterated in the 2007 Energy White Paper. Available free from DECC, Energy Statistics Team, 3rd Floor, Area E, 3 Whitehall Place, London SW1A 2HD, tel. 0300 068 5056 and from the Publications Orderline. It is also available on the Internet at: www.decc.gov.uk/en/content/cms/statistics/publications/indicators/indicators.aspx. A further set of background indicators (charts and tables) will be available on the internet (web address as above) in October 2009.

Energy Consumption in the United Kingdom

Energy consumption in the United Kingdom brings together statistics from a variety of sources to produce a comprehensive review of energy consumption in the UK since the 1970s. The data describes the key trends in energy consumption in the UK since 1970 with a particular focus on trends since 1990. The information is presented in five sections covering overall energy consumption and energy consumption in the transport, domestic, industrial and service sectors. It includes an analysis of the factors driving the changes in energy consumption, the impact of increasing activity, increased efficiency, and structural change in the economy. It is also available on the Internet at: www.decc.gov.uk/en/content/cms/statistics/publications/ecuk/ecuk.aspx

Energy White Paper, 'Meeting the Energy Challenge'

The Government's Energy White Paper, 'Meeting the Energy Challenge' was published by the Secretary of State for Trade and Industry on 23 May 2007, and sets out the Government's international and domestic energy strategy. It shows how the Government are implementing the measures set out in the Energy Review Report in 2006, as well as those announced since, including in the Pre-Budget Report in 2006 and the Budget in 2007. The White Paper is available on the Internet at: www.decc.gov.uk/en/content/cms/what_we_do/what_we_do.aspx and in hard copy from The Stationery Office.

Energy Markets Outlook

The Energy Markets Outlook report provides energy market information on security of supply, looking forward over a fifteen-year time span. The intention is to help develop a shared understanding of the longer-term outlook for energy supply and demand, and to help understand emerging risks that could affect security of supply. Available free from DECC (0300 068 6086). It is also available on the Internet at: www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/markets/markets.aspx

Energy Bill

The Energy Bill was published by the Secretary of State for Business, Enterprise and Regulatory Reform on 10 January 2008 in tandem with the Nuclear White Paper. The Bill, alongside the Climate Change and Planning Bills, contains the legislative provisions required to implement UK energy policy following the publication of the Energy Review 2006 and the Energy White Paper 2007. This policy is driven by the two long-term energy challenges faced by the UK: tackling climate change by reducing carbon dioxide emissions, and ensuring secure, clean and affordable energy. The Bill has been published on the Internet at: <http://services.parliament.uk/bills/2007-08/energy.html>

Nuclear White Paper, 'Meeting the energy challenge: a White Paper on nuclear power'

The Government's Nuclear White Paper, 'Meeting the energy challenge: a White Paper on nuclear power' was published by the Secretary of State for Business, Enterprise and Regulatory Reform on 10 January 2008. The White Paper is the response to the Government's public consultation "The Future of Nuclear Power" on whether it is in the public interest to allow energy companies to invest in new nuclear power stations. The White Paper is available on the Internet at:

www.decc.gov.uk/en/content/cms/what_we_do/what_we_do.aspx and in hard copy from The Stationery Office.

Climate Change Bill

The Climate Change Bill was published by the Secretary of State for Environment, Food and Rural Affairs on 14 November 2007. The Bill will create a new approach to managing and responding to climate change in the UK through: setting ambitious targets, taking powers to help achieve them, strengthening the institutional framework, enhancing the UK's ability to adapt to the impact of climate change and establishing clear and regular accountability to the UK, Parliament and devolved legislatures. The Bill contains provisions that will set a legally binding target for reducing UK carbon dioxide emission by at least 26 per cent by 2020 and at least 60 per cent by 2050, compared to 1990 levels. The Bill has been published on the Internet at: <http://services.parliament.uk/bills/2007-08/climatechange.html>

Planning Bill

The Planning Bill was published by the Secretary of State for Communities and Local Government on 27 November 2007. The Bill introduces a new system for approving major infrastructure of national importance, such as energy developments like nuclear power, and replaces current regimes under several pieces of legislation. The objective is to streamline these decisions and avoid long public inquiries. The Bill has been published on the Internet at: <http://services.parliament.uk/bills/2007-08/planning.html>

UK Energy and CO2 emissions projections

The Updated Energy Projections (UEP) are published annually by DECC. They provide updated projections and analysis of energy use and carbon dioxide emissions in the UK. The UEP exercise incorporates all firm environmental policy measures and is based on updated assumptions consistent with the most recent UK Budget announcements. The latest report is available on the Internet at: www.decc.gov.uk/en/content/cms/statistics/projections/projections.aspx

The UK Fuel Poverty Strategy

Produced by DECC, the strategy sets out the Government's objectives, policies and targets for alleviating fuel poverty in the UK over the next 10 years. Available free from the Publications Orderline and on the Internet at:

www.decc.gov.uk/en/content/cms/what_we_do/consumers/fuel_poverty/strategy/strategy.aspx

The UK Fuel Poverty Strategy, Annual Progress Report

Produced by DECC in association with the Devolved Administrations. This report sets out the progress that has been made on tackling fuel poverty and is accompanied by detailed annexes.

The report is available on the Internet at:

www.decc.gov.uk/en/content/cms/what_we_do/consumers/fuel_poverty/strategy/strategy.aspx

Free copies are available from the Publications Orderline.

Other publications including energy information

General

Digest of Welsh Statistics (annual); *Welsh Assembly Government*
Eurostat Yearbook (annual); *Statistical Office of the European Communities - Eurostat*
Eurostatistics - Data for Short Term Analysis; *Statistical Office of the European Communities – Eurostat*
High Level Summary of Statistics: Key Trends for Scotland; *Scottish Government*
Monthly Digest of Statistics; *UK Statistics Authority*
Northern Ireland Annual Abstract of Statistics; *Northern Ireland Statistics and Research Agency*
Overseas Trade Statistics of the United Kingdom; *H.M. Revenue and Customs*

- Business Monitor OTS1 (monthly) (trade with countries outside the EC)
- Business Monitor OTS2 (monthly) (trade with the EC and the world)
- Business Monitor OTSQ (quarterly) (trade with the EC)
- Business Monitor OTSA (annually) (trade with the EC and the world)

Regional Trends (annual); *UK Statistics Authority*
Regional Yearbook (annual); *Statistical Office of the European Communities – Eurostat*
Statistics in Focus - energy and industry (ad hoc); *Statistical Office of the European Communities - Eurostat*
United Kingdom Minerals Yearbook; *British Geological Survey*

Energy

BP Statistical Review of World Energy (annual); *BP*
Energy - Monthly Statistics; *Statistical Office of the European Communities – Eurostat*
Energy - Yearly Statistics; *Statistical Office of the European Communities – Eurostat*
Energy Balance Sheets; *Statistical Office of the European Communities – Eurostat*
Panorama of Energy; *Statistical Office of the European Communities – Eurostat*
Energy Statistics and Balances of Non-OECD Countries (annual); *International Energy Agency*
Energy Statistics and Balances of OECD Countries (annual); *International Energy Agency*
UN Energy Statistical Yearbook (annual); *United Nations Statistical Office*

Coal

Annual Reports and Accounts of The Coal Authority and the private coal companies; (*apply to the Headquarters of the company concerned*)
Coal Information (annual); *International Energy Agency*
Coal Statistics (quarterly); *International Energy Agency*

Electricity

Annual Report of The Office of Gas and Electricity Markets; *OFGEM*
Annual Reports and Accounts of the Electricity Supply Companies, Distributed Companies and Generators; (*apply to the Headquarters of the company concerned*)
Electricity Information (annual); *International Energy Agency*
Electricity Statistics (quarterly); *International Energy Agency*
National Grid - Seven Year Statement - (annual); *National Grid*

Environment

e-Digest of Environmental Statistics; *Department for Environment, Food and Rural Affairs (Defra)*.
Sustainable development indicators in your pocket; *Department for Environment, Food and Rural Affairs (Defra)*

Oil and gas

Annual Reports and Accounts of National Grid, Centrica and other independent gas supply companies; (*contact the Headquarters of the company concerned directly*)
Oil and Gas Information (annual); *International Energy Agency*
Oil and Gas Statistics (quarterly); *International Energy Agency*
UK Petroleum Industry Statistics Consumption and Refinery Production (annual and quarterly); *Energy Institute*

Prices

Energy Prices and Taxes (quarterly); *International Energy Agency*

Gas and Electricity Market Statistics (annual); *Statistical Office of the European Communities - Eurostat (substitutes the previous publications "Energy prices", "Gas prices" and "Electricity prices")*

Renewables

Renewables Information (annual); *International Energy Agency*

Useful energy related web sites

The DECC web site can be found at www.decc.gov.uk/, the energy information and statistics web site is at www.decc.gov.uk/en/content/cms/statistics/statistics.aspx

Other Government web sites

Central Office of Information	www.coi.gov.uk
Department for Communities and Local Government.	www.communities.gov.uk
Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Department for Transport	www.dft.gov.uk
HM Government Online	www.direct.gov.uk
HM Revenue and Customs	www.hmrc.gov.uk
Northern Ireland Executive	www.northernireland.gov.uk
Ofgem (The Office of Gas and Electricity Markets)	www.ofgem.gov.uk
The Scottish Government	www.scotland.gov.uk
The Scottish Parliament	www.scottish.parliament.uk
UK Parliament	www.parliament.uk
UK Statistics Authority	www.statisticsauthority.gov.uk
Welsh Assembly Government	www.wales.gov.uk

Other useful energy related web sites

AEA Energy & Environment	www.aeat.co.uk
Association of Electricity Producers	www.aepuk.com
BP	www.bp.com
British Geological Survey	www.bgs.ac.uk
British Wind Energy Association	www.bwea.com
Building Research Establishment	www.bre.co.uk
Coal Authority	www.coal.gov.uk
Consumer Focus	www.consumerfocus.org.uk/
Energy Institute	www.energyinst.org.uk
Energy Networks Association	www.energynetworks.org
Environmental Industries Sector Unit	www.uktradeinvest.gov.uk/ukti/environment
Europa (European Union Online)	http://europa.eu/
Eurostat	http://epp.eurostat.ec.europa.eu/
Interconnector (UK) Ltd	www.interconnector.com
International Energy Agency	www.iea.org
Iron and Steel Statistics Bureau	www.issb.co.uk
National Grid	www.nationalgrid.com
Oil & Gas UK	www.ukooa.co.uk
The Stationery Office	www.tso.co.uk
UK Air Quality Archive	www.airquality.co.uk
UK Petroleum Industry Association	www.ukpia.com
United Nations Statistics Division	http://unstats.un.org/unsd/default.htm
US Department of Energy	www.energy.gov
US Energy Information Administration	www.eia.doe.gov

Annex D

Major events in the Energy Industry

To June 2009 **Carbon Capture and Storage**

The Secretary of State for Energy and Climate Change announced in a statement to Parliament in April 2009 a new generation of coal-fired power stations equipped for carbon capture and storage, of which up to four such plants could be built by 2020.

Carbon Emissions Reduction Target

The Government published in February 2009 a consultation on proposals to amend the Carbon Emissions Reduction Target (CERT) through the Electricity and Gas (Carbon Emissions Reduction) Order 2008. This supports a key element of the Prime Minister's £1 billion Home Energy Saving Programme announced in September 2008.

Climate Change

The Chancellor announced the UK's first three 'carbon budgets' alongside his fiscal Budget in April 2009, and also set out new measures designed to help low carbon industries capitalise on the opportunities presented by the UK's legally binding target to cut greenhouse gas emissions to at least 80% below 1990 levels by 2050. The new measures include:

- Legally binding carbon budgets for the first three five-year periods 2008-2012, 2013-2017 and 2018-2022.
- A revised target to reduce emissions to at least 34% below 1990 emissions by 2018-22.
- Aim to meet the carbon budgets announced through domestic action alone, and consistent with this, setting a zero limit in the non-traded sector on offsetting through international credits for the first budget period.
- Commitment to tighten the budget after Copenhagen in December 2009, once we have a global climate change agreement.

Electricity

The Government granted consent in February 2009 for three new power stations capable of providing approximately four million homes with electricity to be constructed at Pembroke, King's Lynn and Hatfield. The new gas fired power stations will produce around 4 gigawatts of power.

Emissions Trading

The Government announced in February 2009 that it intends to auction four million allowances in its second auction as part of the EU ETS. In 2009 the UK plans to auction a total of 25 million allowances

Energy Policy

In February 2009 the Department of Energy and Climate Change, together with the Department for Communities and Local Government, published three consultation documents: the Heat and Energy Saving Strategy (HESS), the Carbon Emissions Reduction Target uplift (CERT) and the Community Energy Saving Programme (CESP). These home energy efficiency measures make up a comprehensive package to save people energy and reduce emissions from now through to 2020 and beyond.

2009 continued

Fuel Poverty

In April 2009, following a review, it was announced that the Warm Front Scheme had been changed to improve the quality of service for its customers. Households connected to the gas grid are now eligible for grants of up to £3500, up from £2700, while those in areas off the gas grid can apply for funding up to £6000, an increase of £2000.

Nuclear

A list of eleven sites that could be potential hosts to new nuclear power stations in the UK, and be operational by 2025, was published in April 2009.

In January 2009, EDF's £12.5 billion purchase of British Energy Group plc (British Energy) was completed. The purchase is a significant step in EDF's plans to build four new nuclear reactors in the UK. The sale, which includes the 36 per cent stake in the company held by the Government's Nuclear Liabilities Fund, raises approximately £4.4 billion towards the cost of decommissioning British Energy's existing nuclear power stations.

Oil and Gas

A proposed new licensing scheme which will open up an area of up to 200 miles around the UK for offshore gas storage and importation projects was announced in a consultation document published in February 2009. The scheme will create a regulatory environment that will encourage investment in new gas supply infrastructure, including gas storage.

Renewables

In May 2009 E.ON, Dong and Masdar announced the go ahead of the first phase of the London Array offshore windfarm. The 1 Gigawatt London Array, to be situated off Kent and Essex, will be the biggest offshore wind farm in the world, generating enough electricity to power a quarter of Greater London's homes, with the first power feeding into the grid by 2012.

Smart Meters

All homes in Britain will have smart meters installed by 2020 under plans published by the Government in May 2009. Smart meters enable meter readings to be taken remotely and together with a display device give householders real time information on their energy use. The new information smart meters provide will help consumers to see what energy they are using and how to save money on their bills.

2008

Energy Bill

The Energy Bill was published in January 2008 in tandem with the Nuclear White Paper. The purpose of the Bill, alongside the Climate Change and Planning Bills, is to update and strengthen the legislative framework so that it is appropriate for today's energy market and fit for the challenges to be faced on climate change and security of supply. Key elements of the bill are:

- Create a regulatory framework to enable private sector investment in Carbon Capture and Storage projects while also protecting the environment;
- Ensure adequate funding provision be made by potential developers of new nuclear power stations to pay the full costs of decommissioning and their full share of waste management costs.
- Strengthen and simplify the regulatory framework to give investors more clarity and certainty, reducing costs and risks for private sector investment in offshore gas supply projects such as offshore storage and liquefied natural gas infrastructure.

2008 (continued)

- Strengthen the Renewables Obligation (RO) to drive greater and more rapid development of renewables in the UK. Proposals include amending the RO to give more support to new and emerging technologies such as offshore wind, wave and tidal by banding the Obligation.
- Measures to be brought forward for offshore renewables decommissioning, ensuring that companies have adequate decommissioning funds so that both the tax payer and the offshore environment is protected.

Carbon Capture and Storage

The Government published, in June 2008, a consultation on the legislative framework for Carbon Capture and Storage (CCS), including carbon capture readiness. The consultation sets out the Government's views on CCS as a 'high potential' carbon abatement technology and asks for views on what more can be done to promote, develop and deploy CCS in the UK, EU and globally.

Climate Change

In December 2008 the Committee on Climate Change published its inaugural report 'Building a low-carbon economy - the UK's contribution to tackling climate change'. The report contained the Committee's recommendations on the 2050 emissions reduction target and advised on the levels of the UK's first three legally binding carbon budgets for 2008-2022.

In December 2008 at a meeting of the European Council EU leaders agreed measures to deliver a unilateral commitment to reduce greenhouse gas emissions by 20% by 2020 compared to 1990 levels.

In October 2008, the Government committed the UK to cutting greenhouse gas emissions by 80% on 1990 levels by 2050 as a major contribution to a global deal on climate change.

Coal

Tower Colliery, the last deep mine in Wales, closed in January 2008, thirteen years after its workforce rescued it from the pit closure programme.

Electricity

The Government announced, in January 2008, its support for electricity generated from geopressure through the Renewables Obligation scheme, which provides companies using green energy sources with assistance in competing with fossil fuel generators.

Emissions Trading

In November 2008, the Government held Europe's first carbon allowance auction in Phase II (2008-2012) of the EU Emissions Trading Scheme (EU ETS). Four million allowances were sold at a total value of £54m excluding VAT.

The proposals announced by the European Commission in January 2008 for tackling climate change and delivering a low carbon economy in Europe put the EU Emissions Trading Scheme at the heart of EU climate policy, including establishing an EU wide central cap on emissions covered by the EU ETS to 2020 and beyond.

Energy Policy

The second Energy Markets Outlook report, published in December 2008, set out the risks and drivers associated with future security of energy supply, including scenarios for future security of supply of electricity and gas and the full range of other fuels.

2008 (continued) Machinery of Government changes announced in October 2008 resulted in Energy Policy being transferred from the Department for Business, Enterprise and Regulatory Reform, and Climate Change Policy being transferred from the Department for Environment, Food and Rural Affairs to the new Department of Energy and Climate Change.

EU Energy Review

The European Commission's proposals for tackling climate change and delivering a low carbon economy in Europe were announced in January 2008. The proposals implement the decisions agreed by EU Heads of State and Government at the 2007 Spring European Council. For the UK, the Commission's proposals include:

- a reduction of 16 per cent in UK greenhouse gas emissions from sectors not covered by the EU ETS by 2020 from 2005 levels;
- for 15 per cent of the energy consumed in the UK to come from renewable sources by 2020;
- for 10 per cent of road transport fuels to come from renewable sources, subject to them being produced in a sustainable way.

Fuel Poverty

Help for people struggling with high home energy bills was announced in November 2008 by the Chancellor in the Pre-Budget Report, with additional Warm Front funding of £100 million, and £50 million of existing allocation to be spent a year sooner than planned.

The Government published its UK Fuel Poverty Strategy Sixth Annual Progress Report in October 2008, reporting on the progress made since the last report, highlighting key areas for attention during the coming year, and setting out the fuel poverty figures for 2006. As part of the progress report, annexes were also produced on methodology, detailed analyses of the fuel poor, fuel poverty monitoring and company schemes and case studies.

In September 2008, the Government announced a new package of measures to help people with their gas and electricity bills. The launch of the Home Energy Saving Programme will offer energy efficiency and other measures to households in deprived areas and will be funded by energy suppliers and electricity generators. Suppliers will also fund a 20% expansion in CERT, and increase their collective spend on social programmes to £225million over the next three years.

A raft of new measures was agreed at a Fuel Poverty Summit hosted by OFGEM in May 2008 to help vulnerable consumers access the best available tariffs.

In April 2008, the six largest energy suppliers individually agreed to spend an extra £225m over three years to help those squeezed by rising fuel bills, which could lift 100,000 households out of fuel poverty.

Heat

In January 2008, following a commitment in the 2007 Energy White Paper, BERR along with Defra and DCLG published the Heat Call for Evidence. The Call for Evidence will play an important part in developing a strategy for heat given that half of all UK's CO₂ emissions arise from the use of heat.

Nuclear

In September 2008 EDF announced that its proposed takeover offer for British Energy included substantial investment to build four new reactors, two each at Hinckley Point and Sizewell, with a total generating capacity of 6.4GW of electricity.

The Government published in July 2008 its Strategic Siting Assessment of where new nuclear power stations could safely and securely be built across England and Wales.

2008 (continued) In June 2008 the Secretary of State for Business, Enterprise and Regulatory Reform announced the creation of a Nuclear Development Forum to provide regular discussions between Government and industry, and an Office of Nuclear Development to provide a single focus within Government on the development of new nuclear.

The Government's response to its nuclear consultation, in the form of a White Paper, was published alongside the Energy Bill in January 2008. Following the consultation, the Government has now decided that it is in the public interest to allow private sector energy companies to invest in new nuclear power stations. Building of new nuclear power stations is expected to commence in 2013-2014 with operation commencing in 2017-2020.

Oil and Gas

171 new licences were offered, in November 2008, to 100 companies covering 257 blocks of the North Sea as part of the 25th offshore oil and gas licensing round.

Brent crude oil prices topped \$100 a barrel for the first time in March 2008, and rose as high as \$141 a barrel in June 2008.

Industrial action by oil workers at the Grangemouth refinery in April 2008 led to the temporary closure of the Forties oil pipeline, which provides 30% of the UK's daily oil output from the North Sea.

A record breaking 2,297 blocks or part blocks in UK waters were offered, in February 2008, for exploration in the 25th Offshore Oil and Gas Licensing Round.

Renewables

In December 2008 at a meeting of the European Council EU leaders agreed a commitment to 20% of all energy to come from renewable sources by 2020 (including a 10% target for the use of renewable fuels in transport).

The Chancellor announced in the Pre-Budget Report in November 2008 the extension of the Renewables Obligation from its current end date of 2027 to at least 2037. The extension will ensure that investors can plan with confidence for the future so that over the next decade the market will continue to deliver the renewables projects that are needed to achieve the 2020 target.

In October 2008 the UK overtook Denmark to become the world's number one for wind farms built offshore, with 597MW fully constructed. The achievement was made possible after building work finished at Centrica's Lynn and Inner Dowsing wind farms near Skegness. Offshore wind farms now have the potential to power the equivalent of around 300,000 UK homes.

The Government published, in June 2008, a consultation on the UK Renewable Energy Strategy. The consultation puts forward a package of measures to drive up the use and deployment of renewable energy as part of the UK goal to tackle climate change and ensure security of supply and to enable the UK to meet its EU 2020 target.

The Crown Estate launched, in June 2008, its round 3 leasing programme for the delivery of up to 25 GW (gigawatts) of new offshore windfarm sites by 2020. The announcement was made at the BWEA (British Wind Energy Association) conference in central London.

The UK's offshore renewable industry will benefit from measures, jointly announced by the Government and Ofgem in January 2008, to connect at least £2 billion of investment to the national grid. The investment will support the delivery of the necessary infrastructure to connect 8 gigawatts of planned offshore wind generation.

2008 (continued) **Retail Prices**

The Chancellor announced in November 2008 in the Pre-Budget Report that Ofgem will publish quarterly reports over the coming year showing the relationship between wholesale prices, estimated hedged wholesale costs and average retail prices for gas and electricity. This will make it clearer when companies are passing the benefits of downward price changes through to their consumers and will ensure transparency over future price changes. The first report was published in February 2009.

2007

Energy Policy

The Planning Reform Bill was published in November 2007. The Bill will make the planning system quicker, more transparent and easier for the public to become involved in, and will reform the planning system for major infrastructure projects including climate change and energy security. At a local level, the Bill and other reforms published at the same time will allow people to install small-scale renewable power sources such as solar panels and wind turbines without planning permission if they do not affect their neighbours.

The Energy Markets Outlook report, published in October 2007, provides energy market information on security of supply, looking forward over a fifteen-year time span. The report is intended to help develop a shared understanding of the longer-term outlook for energy supply and demand, and to help understand emerging risks that could affect security of supply.

Machinery of Government changes announced in June 2007 resulted in Energy Policy being transferred from the former Department of Trade and Industry to the new Department for Business, Enterprise and Regulatory Reform.

Energy White paper

The 2007 Energy White Paper (EWP), 'Meeting the Energy Challenge' was published in May 2007. The paper reiterated the Government's commitment to the four key energy policy goals. The EWP, in response to the twin challenges of climate change and security of supply announced a strategy to deliver energy security and accelerate the transition to a low carbon economy. The key elements of the strategy are:

- Establish an international framework to tackle climate change;
- Provide legally binding carbon targets for the whole UK economy, progressively reducing emissions;
- Make further progress in achieving fully competitive and transparent international markets;
- Encourage more energy saving through better information, incentives and regulations;
- Provide more support for low carbon technologies; and
- Ensure the right conditions for investment, including improvements to the planning system.

Carbon Capture and Storage

The launch of the competition to build one of the world's first commercial-scale carbon capture and storage (CCS) plants was among the measures set out in a major speech on climate change given by the Prime Minister at a WWF event in November 2007.

The 2007 Energy White Paper provided further details of the competition to develop the UK's first commercial-scale demonstration of a Carbon Capture and Storage (CCS) Plant. The CCS plant will be due to be operational early in the next decade. This competition was announced in the 2007 Budget.

2007 (continued) **Carbon Reduction Commitment**

The 2007 Energy White Paper outlined plans to introduce a mandatory cap and trade scheme, a Carbon Reduction Commitment, which will apply to the largest non-energy intensive public and private sector organisations.

Climate Change

The Climate Change Bill was published in November 2007. The Bill sets out a framework that will put Britain on the path to become a low-carbon economy, with clear, legally binding targets to reduce carbon dioxide emissions by at least 60% by 2050, and 26 to 32% by 2020, against 1990 levels. As well as setting clear targets, the Bill provides a pathway to achieve those reductions through a system of five-year carbon budgets set fifteen years ahead.

The Government published the Energy Measures Report, Addressing Climate Change and Fuel Poverty – energy measures information for Local Government, in September 2007. The report sets out the steps that local authorities can take to: improve energy efficiency; increase the levels of microgeneration and low carbon technologies; reduce greenhouse gas emissions; and reduce the number of households living in fuel poverty.

In September 2007 the location of the Energy Technologies Institute (ETI), backed by up to £550m of Government investment announced by the Chancellor in the 2006 Budget, was announced. The ETI, based in Loughborough, will bring more focus, ambition and collaboration to the UK's energy, science and engineering drive. It will have a potential budget of over £1bn.

The Government's blueprint for tackling climate change was published in March 2007. The draft bill, the first of its kind in any country, and accompanying strategy, set out a framework for moving the UK to a low-carbon economy.

Electricity

In May 2007 National Grid and TenneT Holding announced plans to construct a 260km, 1,000 MW electricity interconnector "BritNed" between the Netherlands and the UK. It is expected to be commissioned by late 2010.

Severe weather caused widespread damage to power lines in England and Wales, with supplies to over 1.2m customers being affected in January 2007. The Electricity industry performed well in restoring supply, with over 90% of interrupted supplies back on within 24 hours.

Emissions Trading

The Government published the National Allocation Plan (NAP) in March 2007; the plan includes a list of the allowances to be allocated to individual installations covered by the EU ETS for each year in the second phase.

EU Energy Review

The Council of the European Union at its Spring meeting in March 2007 called on Member States and EU institutions to pursue actions to develop a sustainable integrated European climate and energy policy. These include increasing security of supply; ensuring the competitiveness of European economies and the availability of affordable energy, and promoting environmental sustainability and combating climate change.

The European Commission published its Strategic Energy Review in January 2007, outlining proposals for the development of the internal energy market in the European Union. These include the greater unbundling of energy network businesses from other activities, more effective regulation and greater transparency.

2007 (continued) **Fuel Poverty**

The Government published its UK Fuel Poverty Strategy Fifth Annual Progress Report in December 2007, reporting on the progress made since the last report, highlighting key areas for attention during the coming year, and setting out the fuel poverty figures for 2005. As part of the progress report, annexes were also produced on methodology, detailed analyses of the fuel poor, fuel poverty monitoring and company schemes and case studies.

Measures worth £2.3bn over three years to tackle fuel poverty and home energy efficiency, the Carbon Emissions Reduction Target (CERT), were laid in Parliament in December 2007. The Government also announced an £800m three year grant for the Warm Front Scheme, which could assist 400,000 of the poorest households in England.

The 2007 Energy White Paper outlined a range of new policies which will see a further 200,000 households being taken out of fuel poverty by 2010. These included: providing a benefit entitlement check to all households that require one; enabling the sharing of benefit information; putting in place a cross-Government communications campaign in time for next winter, and encouraging energy suppliers to do more.

Nuclear

In May 2007 alongside the Energy White Paper a consultation on the role of nuclear power in a low carbon UK economy was launched. The consultation seeks views on whether the private sector should be allowed to build new nuclear power stations.

In February 2007 the High Court in a judicial review decided that the consultation process on new nuclear power that preceded the Energy Review Report had not been adequate. The Government then decided that a new consultation on nuclear power was required.

Oil and Gas

In October 2007 the Langeled pipeline to Easington in Yorkshire from the Ormen Lange field in Norway, became connected directly to the British gas network.

The May 2007 Energy White Paper announced legislation to allow the storage of natural gas under the seabed and unloading of Liquefied Natural Gas at sea.

A milestone was reached in March 2007 when three new fields were approved, taking the total number of offshore oil and gas developments in the North Sea's 40 years history to 350.

The Excelerate project, a world first 'liquid gas' shipment on Teesside, with enough power in one 20,000 tonne shipment to fuel 60,000 homes began operation in February 2007.

The very large Buzzard field, one of the largest oil discoveries to be developed in British waters in more than a decade, started production in January 2007.

Renewables

Harnessing the vast potential of the UK's island status entered a new phase in December 2007 when the Government announced proposals to open up its seas to up to 33GW (gigawatts) of offshore wind energy.

A major expansion of energy from renewable sources was among the measures set out in a major speech on climate change given by the Prime Minister at a WWF event in November 2007. It was announced that tidal lagoons and barrages below one gigawatt capacity will receive extra support through the Renewables Obligation, potentially benefiting lagoons proposed for Rhyl, Swansea Bay and elsewhere.

2007 (continued) A new report, Essential role of renewables generation in achieving zero carbon homes, published in November 2007, from the Renewables Advisory Board (RAB) which advises Government on renewable energy issues, provided the first in depth analysis of the role of on site energy generation in the delivery of the Government's policy of ensuring that all new homes are zero carbon from 2016. Amongst its findings is the conclusion that the policy could drive a market for onsite renewable worth £2.3 billion a year from 2016.

The May 2007 Energy White Paper announced legislation to band the Renewables Obligation to benefit offshore wind, wave, tidal and other emerging technologies.

The Government announced the development of the licensing regime for would be electricity transmission owners in the UK's pioneering offshore wind energy sector in March 2007. After a joint consultation the DTI decided in agreement with Ofgem that Britain's monopoly electricity transmission network owners will have the opportunity to compete against a wider range of transmission companies to build, own and maintain the links.

The opening of the Braes and Doune wind farm in February 2007 took the UK's wind generation capacity above 2 GW, making the UK one of only 8 countries in the world to have achieved this level.

Sustainable Energy Policy

The Fourth Annual Report on progress towards the 2003 Energy White Paper goals was published in May 2007, reviewing progress made over the last 12 months. Published as a supplement to the Fourth Annual Report, UK Energy Sector Indicators was also published in May 2007.

2006

Sustainable Energy Policy

On 16th February 2006 the Government issued a consultation paper on carbon dioxide emissions projections for industrial sectors covered by the EU Emissions Trading Scheme. These projections are being used as an input to the development of the UK National Allocation Plan for Phase II of the scheme, informing the allocation of carbon dioxide allowances to installations in the 2008-12 period. The consultation closes on April 13th.

The Third Annual Report to the Energy White Paper was published in May 2006, reviewing progress made over the last 12 months towards the targets and strategy for energy policy until 2050. Published as a supplement to the Third Annual Report, Energy Sector Indicators 2006 was also published in May 2006.

Energy Review

The Energy Review Report "The Energy Challenge" detailing what needs to be done to stay on track to meeting the goals in the 2003 Energy White Paper was published in July 2006. The Report outlined proposals designed to reduce demand, secure a mix of clean, low-carbon sources, and streamline the planning process for energy projects.

The 12 week consultation period for the energy review ended on the 12 April 2006 with over 5,300 responses from individuals, businesses, academics and NGOs.

Climate Change

The Office of Climate Change (OCC) was established in October 2006. It is a shared resource across Government established with the aim of ensuring that analysis and policy work is consistent and supports the overall climate change strategy.

2006 (continued) The Stern Review of economics of climate change was published in October 2006 and confirmed that climate change is real and is a problem that can only be solved by collective international action. The Review demonstrated that urgent action is needed to mitigate the effects of climate change and that the costs of global action to mitigate the most dangerous effects of climate change are significant but manageable, as long as action is taken multilaterally.

An ambitious programme to tackle climate change domestically and to secure agreement on action to reduce global greenhouse gas emissions was published by the Government on 28 March 2006. The Programme is expected to reduce the UK's emissions of greenhouse gases to 23-25 per cent below base year levels and reduce the UK's carbon dioxide emissions to 15-18 per cent below 1990 levels by 2010.

Fuel Poverty

The Government published its UK Fuel Poverty Strategy Fourth Annual Report in June 2006, reporting on the progress made since the last year's report, and setting out the fuel poverty figures for 2004. Also published were a series of annexes, setting out the detailed profile of the fuel poor, as well as outlining the many activities in which energy companies are involved to tackle fuel poverty and associated problems. In the report, we also responded to the recommendations made by The Fuel Poverty Advisory Group in its Third Annual Report, which was published in March 2006. The new Home Heat Helpline operated by the Energy Retail Association has been up and running since October 2005.

Emissions Trading

The UK's National Allocation Plan (NAP) for the second phase of the EU Emissions Trading Scheme (2008-2012) was accepted without change by the European Commission in December 2006.

On 21st March 2006 the Government published 15 (independently produced) reports reviewing and revising methodologies for calculating the New Entrants' benchmarks for sectors covered by Phase II of the EU – Emission Trading Scheme. The benchmarks will form the basis for the calculation of New Entrant allocations of carbon dioxide allowances to installations in the 2008-2012 period and will therefore form an important part of the development of the UK National Allocation Plan for Phase II of the EU – Emissions Trading Scheme

The draft Phase II National Allocation Plan was published for consultation, alongside the Climate Change Programme Review, on 28 March. The number of CO₂ allowances for Phase II will be set within a range representing a reduction of 3 to 8 MtC a year against projected business as usual emissions. The final decision on this should be made in June. The NAP also incorporate proposals on scope (some new sectors added in); allocation methodology; sector classification and new entrant policy.

Coal

British Gas owner Centrica announced in November 2006 that it wants to build the UK's first clean coal power plant, which could supply electricity to a million homes. The company has reached agreement with developer Progressive Energy to develop a station on Teesside, combining clean coal and carbon capture technology. Gasification technology will produce synthetic gas from coal, and the resulting carbon emissions would then be captured and stored. The Teesside plant would be the first coal-fired station since Drax was built in 1974. Centrica said it would have the fewest emissions of any fossil fuel power station in Britain.

UK Coal's Rossington colliery closed on 31 March 2006.

2006 (continued) **Oil and Gas**

Market investment in new and enhanced UK gas infrastructure has continued with the completion of the Langeled pipeline in September 2006 and Balgzand-Bacton Line (BBL) pipeline in December 2006 allowing increased flows of Norwegian and Continental gas to the UK.

A milestone in the history of the UK's offshore oil and gas industry was reached with the start of drilling on the 10,000th well in the seabed around the British Isles in October 2006.

The UK is expected to be a net importer of oil and oil products in 2006, returning to being a net exporter in 2007 as a result of the very large Buzzard field that is due to commence production in the fourth quarter of 2006.

Electricity

Centrica announced in June 2006 that it would construct an 885 MW CCGT power station at Langage, Plymouth which is expected to be operational by 2008.

Renewables

Following the Energy Review, a two part consultation document was published in October 2006. Part 1 consulted on proposals to introduce changes to the Renewables Obligation and Part 2 was a statutory consultation on a small limited number of changes to the Renewables Obligation which came into effect from April 2007.

DTI announced development consent approval to two offshore windfarms, both in the Thames Estuary, in December 2006. London Array, at 1,000 megawatts, will be the largest offshore windfarm in the world when completed, while Thanet will be 300 megawatts.

The Renewables Obligation Order 2006 has been laid before Parliament. It will come into force on 1 April 2006.

A recent Carbon Trust report has concluded that wave and tidal could in time provide up to a fifth of UK's energy needs.

Winter Energy Supply

In July 2006, the Government established the Business Energy Forum to ensure that sound preparations were made for winter. This is a high level group, jointly chaired by DTI and CBI and bringing together Ofgem, National Grid, energy suppliers and users and other key players in the energy industry. DTI also created a dedicated page on its website, to provide information and signposting on winter energy supply issues.

The second annual report to Parliament on the security of gas and electricity supplies in Great Britain as required under section 172 of the Energy Act 2004 was published in July 2006.

2005

Energy Review

On 29 November 2005 The Prime Minister and Secretary of State for Trade and Industry Alan Johnson announced that asked Energy Minister Malcolm Wicks to lead a review of UK energy policy. The main scope of the review will include aspects of both energy supply and demand and will focus on policy measures to help us deliver our objectives beyond 2010. The Review will aim to ensure the UK is on track to meet the goals of the 2003 Energy White Paper in the medium and long term.

2005 (continued) **Sustainable Energy Policy**

The Energy White Paper published in February 2003 set out the strategy for energy policy until 2050. A second annual report reviewing progress over the last 12 months and the way ahead was published in July 2005. Energy Sector Indicators 2005, a supplement to the Second Annual Report on the Energy White Paper was also published in July 2005.

Fuel Poverty

The Fuel Poverty Advisory Group published its Third Annual Report. Whilst welcoming progress made, as well as the enhancements to the Warm Front. Energy Ministers held a follow up event with the energy supply companies with a proposal to set up a new helpline; a central point of contact for fuel poverty referrals, developed by the energy companies. The new Home Heat Helpline operated by the Energy Retail Association was subsequently set up and started running in October 2005.

Emissions Trading

The EU Emissions trading scheme (ETS) commenced on 1 January. It is one of the policies being introduced across Europe to tackle emissions of carbon dioxide and other greenhouse gases and combat the serious threat of climate change. The first phase runs from 2005-2007 and the second phase will run from 2008-2012 to coincide with the first Kyoto Commitment Period. Further 5-year periods are expected subsequently.

The scheme works on a "Cap and Trade" basis. EU Member State governments are required to set an emission cap for all installations covered by the scheme. Each installation is then be allocated allowances for the particular commitment period in question. The number of allowances allocated to each installation for any given period, (the number of tradable allowances each installation will receive), will be set down in a document called the National Allocation Plan.

On 14 February the UK published revised provisional list of installation level allocations under the EU Emissions Trading Scheme, but on 12 April the European Commission formally rejected the British Government's request to increase the number of allowances for use in the first phase by 20 million tonnes, but the UK has lodged an appeal. Distribution of the 736 million tonnes of CO₂ allowances by Defra to eligible installations in the UK began in April 2005.

Coal

Ellington colliery ceased production in January 2005.

The Live Fast Track Offer Scheme for respiratory disease claimants, which will see around 80,000 miners offered optional risk payments where initial medical tests show very low levels of lung disease, went live on 28 February.

The cut-off date for the majority of live Vibration White Finger Services claimants passed on 31 March 2005. However, there were some agreed exceptions to this date – live claimants had until 6 months from the General Damages medical to claim and beneficiaries have up to 31 January 2006 to make claims on behalf of claimants who died before 31 March 2005.

Oil and gas

February 2005 - BP's Clair field inaugurated. Clair was the largest undeveloped UKCS resource. BP and partners invested around £650 million in the project, which is expected to recover reserves of up to 300 million barrels of oil, with potential for a further 400 million barrels.

2005 (continued) 21 March 2005 - The UK and Netherlands Governments signed an interconnector treaty to allow the construction and operation of the BBL gas pipeline between Balgzand in the Netherlands to Bacton in the UK. This will provide a second direct link between the UK's gas transmission system and that of continental Europe. It is due to be operational from December 2006.

4 April 2005 – The UK and Norwegian Governments signed a new oil and gas co-operation treaty designed to remove the need for a separate treaty each time there is a new project involving cross-boundary development. In particular it will underpin the construction of the Norwegian Langeled gas pipeline (supplying up to 20 per cent of UK gas demand from Winter 2006/07) and will also cover the development of new trans-boundary fields and the use of host infrastructures for developments across the median line.

July 2005 – Imports of liquefied natural gas (LNG) commenced at the Isle of Grain import/storage facility.

6 September 2005 - A record 152 oil and gas production licences were offered to 99 companies under the 23rd Oil and Gas Licensing Round, the highest number since licensing began in 1964. The results, a vote of confidence in the future of oil and gas exploration in the UK, herald the entry of 24 new firms to the North Sea. The licences, covering 264 blocks, are broken down as follows: 70 Traditional licence offers, 38 more than in 2004, 6 Frontier licence offers, 1 less than in 2004, 76 Promote licence offers, 18 more than 2004.

November 2005 - Malcolm Wicks announced that 24 of the 54 "Promote" Licences issued in the 21st Round (2003) would continue. Recognising £90 million exploration investment, Mr. Wicks said "These results prove the innovative drive of the firms involved and the success of the promote licence concept, without which this acreage would not have been touched. With clear work commitments it's a great vote of confidence in the future of the North Sea."

8 November – The UK import capacity of the Bacton – Zeebrugge Interconnector was increased from 8.5bcm/y to 16.5bcm/y. A second phase enhancement, due to be completed by December 2006, is progressing to schedule and will bring the UK import capacity of the system to 23.5 bcm/y.

11 December 2005 – An explosion, said to be the largest incident of its kind in peacetime Europe, destroyed a large section of the Buncefield Oil Depot in Hemel Hempstead. In total 20 petrol tanks were involved in the fire, each said to contain three million gallons of fuel.

21 December 2005 - First gas began flowing from BP's Rhum field, the UK's largest undeveloped gas discovery. BP said, with the combination of a high-pressure, high-temperature gas reservoir developed using a long-distance subsea tieback, that Rhum was a world first. With development costs of £350 million, Rhum is expected to recover reserves of around 800 billion cubic feet of gas, with daily production likely to peak at around 300 million cubic feet. The gas, to come ashore at St Fergus, is expected to meet 2% of UK demand in 2006.

2006 – The UK continued to be a net exporter of oil and oil products in volume terms, but because of the differential in prices of oil and the various oil products, the UK was a net importer in value terms for the first time since the early 1980's.

2005 (continued) **Electricity**

On 1 April 2005, the British Electricity Trading and Transmission Arrangements (BETTA) took effect. BETTA has introduced a single wholesale electricity market across Britain by extending the England and Wales market arrangements to Scotland. This will push prices down for Scottish consumers, and will open up the market and increase competition. The legislation underpinning BETTA was delivered in the Energy Act 2004. Under BETTA, National Grid, who previously operated the transmission network in England and Wales, is now the System Operator for the whole GB network.

Coolkeeragh's new gas-fired power station replaced the Londonderry coal fired power station in March 2005.

In May 2005, E.On UK announced that it had purchased the 392 MW Enfield Energy CCGT power station.

Nuclear

British Energy announced on 14 January that it had successfully completed the restructuring plan it announced in November 2002.

The Nuclear Decommissioning Authority was established on 1 April, following the transfer of assets and other property rights from BNFL and the signature of initial site Management and Operation contracts between NDA and BNFL/UKAEA.

Renewables

Malcolm Wicks announced at the British Wind Energy Annual Conference in Cardiff, that he was giving development consent to a 78 megawatts windfarm at Little Cheyne Court in Walland Marsh, Kent. The decision follows a public inquiry.

On 8 March 2005, the Energy Minister announced that the Government intended to exercise the power in section 185 of the Energy Act to adjust the level of transmission charges paid by renewable generators on the Scottish islands, and possibly the North of mainland Scotland, subject to consultation. A consultation will be launched in the summer of 2005.

The DTI has developed and will implement this year a "Wave and Tidal Stream Energy Demonstration Scheme" worth up to £42 million that will support the first larger-scale wave and tidal farms. This is funded under the £50 million 'Marine Renewables Deployment Fund' announced by the Secretary of State for Trade and Industry in August 2004.

The final conclusions and recommendations of the Eskdalemuir Working Group were accepted by the Ministry of Defence in full. Defence Estates removed all associated holding objections in place against the 1.6 GW of wind developments in the vicinity of the seismic array at Eskdalemuir.

2004

Sustainable Energy Policy

DTI published the first annual report on implementation of the Energy White Paper on 26 April as part of a series of documents, all of which contribute to creating a low-carbon economy. These included the Government's Energy Efficiency Implementation Plan (Defra), the Combined Heat and Power strategy (Defra), a consultation paper about biofuels (DFT), and a range of statistical indicators to monitor progress towards the goals of the White Paper (DTI).

Energy Act

The Energy Act 2004 received Royal Assent on 22 July 2004. It will promote "cleaner, greener power" and competitive and reliable energy supplies for now and generations to come. It implements a range of commitments made in the Energy White Paper.

2004 (continued) For the first time, one public body (the new Nuclear Decommissioning Authority), which published its draft Annual Plan for public consultation on 10 December 2004 will have complete responsibility for the decommissioning and clean-up of the UK's civil nuclear sites, and for the safe and effective management of our nuclear waste.

The Act also creates a single wholesale electricity market for Britain, the British Electricity Trading and Transmission Arrangements ("BETTA"). Provisions within the Act covering electricity and gas interconnectors implement a number of requirements in the EU's 2003 Gas and Electricity Directives and its Electricity Regulation.

Fuel Poverty

The Fuel Poverty Action Plan, which is a Government publication, was issued on 30 November 2004 and sets out how the Government intends to meet its first fuel poverty target for England – that of eradicating fuel poverty in vulnerable households.

Emissions Trading

On 27 October 2004, an announcement was made of the UK's intention to amend the National Allocation Plan for Phase 1 of the EU Emissions Trading Scheme (2005-07) to a higher number of allowances. This reflects finalisation of emission projections showing higher forecast emissions. The new proposed allocation represented a greater reduction against projections than previously indicated.

On 11 November 2004, the final Updated Energy Projections (UEP) informing the National Allocation Plan (NAP) for EU Emissions Trading Scheme (EUETS) were published on the DTI website. This paper presented the results of further revisions to the carbon emission projections that have taken place since May 2004.

Renewables

On 2 August 2004, the Secretary of State announced the new £50m Marine Research Development Fund. This is another step towards promoting renewable energy and complements support already given for other emerging technologies including wind, solar and biomass.

On 4 November 2004, the final terms of reference for the 2005/06 review of the Renewables Obligation (RO) were published. In a separate exercise, a statutory consultation excise for proposed amendments to secure the Renewables Obligation was published on 8 September 2004.

Climate Change

On 8 December 2004 the consultation on the review of the UK Climate Change Programme was launched. The consultation highlights areas where the Government has identified opportunities further to reduce carbon emissions.

Coal

Hatfield colliery closed in January 2004. As part of the closure of the Selby complex Wistow mine closed in May 2004, Stillingfleet in September 2004 and Riccall in December 2004.

Period 2 of the Coal Investment Aid scheme closed on 1 June 2004. 13 applications were received requesting £94.7 million of aid.

The Department reached the key milestone of £1 billion in British Coal Vibration White Finger compensation being paid in week commencing 19 July 2004.

Oil and gas

US oil firm Apache announced plans to spend around £137 million in 2004 on various projects in the Forties field in the North Sea. This included drilling more than 20 wells to gain a "substantial" increase in production.

2004 (continued) The 22nd Offshore and 12th Onshore Oil and Gas Licensing Rounds were announced on 4 March 2004. The 22nd Round made available the largest number of offshore blocks since the 2nd Round in 1965. As well as continuing to include options for "promote" licences and traditional licences, the Round offered a further new form of licence, the "frontier" licence, for blocks in the Atlantic Margin, West of the Shetland Islands.

On 6 July 2004, DTI approved the 300th North Sea field development, Total's Glenelg field, with expected peak production of 30,000 barrels of oil equivalent a day.

On 28 July 2004, DTI approved the Saturn gas field development. Operator, ConocoPhillips, expected first gas in Q4 2005 at an initial rate of 74 million cubic feet a day, with a maximum daily rate of 169 million cubic feet in the following year. Produced gas will be transported via the Lincolnshire Offshore Gas Gathering System to the Theddlethorpe Terminal.

On 3 August 2004, production started from the Lundin-operated Broom field. Oil reserves were estimated to be 36 million barrels for the first phase, with further development opportunities in area currently being evaluated. Broom will also assist substantially in extending the Heather field life.

On 8 October 2004, the UK and Norwegian Governments agreed arrangements to allow the development of two new North Sea fields - Boa and Playfair.

The official launch of the 'Goldeneye' development took place on 11 November 2004. The £300m project, supported by co-venturers Shell, ExxonMobil, Paladin Resources and Centrica Energy, will provide around 3 per cent of the UK's gas.

Electricity

On 1 September 2004, the British Electricity and Trading Arrangements (BETTA) went "Active". This involved the Secretary of State using her powers in the Energy Act 2004 to change licence conditions so that trailing and testing of the new arrangements could begin, in preparation for BETTA going "Live" on 1 April 2005.

The findings of the investigation by DTI's Engineering Inspectorate into the major power failures in London on 28 August 2003 and in Birmingham on 5 September 2003 were communicated to the respective electricity companies in January 2004. Inspectors worked closely with the companies to ensure their recommendations were taken forward.

Scottish Power purchased Damhead Creek power station in June 2004 and became the sole owner of the Shoreham Power station in September 2004. Centrica purchased Killingholme power station in June 2004. In July 2004 Scottish and Southern Energy acquired the Ferrybridge C and Fiddlers Ferry power stations formerly owned by American Electric Power. Carron Energy re-opened the Fifoots Point power station in August 2004 and changed the name of the power station back to Uskmouth.

Nuclear

The Secretary of State announced on 5 January 2004 that British Energy (BE) had completed the sale of its interest in its US joint venture, Amergen, in December 2003. All amounts outstanding under the Government's loan facility to BE have been paid off, but facility remained available to BE up to a maximum of £200 million.

At the end of February 2004 BNFL's Chapelcross nuclear power station closed.

2003

Sustainable Energy Policy

The Sustainable Energy Policy Network (SEPN) website was launched in June 2003. SEPN represented a new way of working for government, ensuring the right communications and links are made across and beyond government to deliver the Energy White Paper.

Royal Assent for the Brian White Sustainable Energy Act was announced on Thursday 30 October 2003. The Act implements the DTI Energy White Paper commitment to provide statutory backing to regulatory impact assessments, including environmental impact assessments, undertaken by Ofgem for all significant new policies. It also provides the legal basis for accessing surplus funds from the Non-Fossil Fuels Obligation held by Ofgem.

Energy White Paper

On 24 February 2003 the Government published its Energy White Paper "Our energy future – creating a low carbon economy". The White Paper set out a new energy policy, designed to deal with the three major challenges that confront the UK's energy system: the challenge of climate change, the challenge of declining indigenous energy supplies, and the need to keep the UK's energy infrastructure up to date with changing technologies and needs.

To address these challenges, the White Paper set four new goals for energy policy: to put the United Kingdom on a path to cut carbon dioxide emissions by some 60 per cent by about 2050, with real progress by 2020; to maintain the reliability of energy supplies; to promote competitive energy markets in the UK and beyond, helping to raise the rate of sustainable economic growth and improve UK productivity; and to ensure that every home is adequately and affordably heated.

For the first time, the environment was put at the heart of Government's energy policy, causing energy efficiency and renewables to feature prominently in the White Paper, as the main ways of delivering carbon cuts.

Energy Markets

Proposals to complete the liberalisation of the electricity and gas markets across the EU were adopted on 15 June 2003. The DTI played a leading role in the Energy Council in ensuring the measures will produce a competitive and open market by 2007.

Fuel Poverty

On 4 March 2003, the Government published its first annual progress report on the UK Fuel poverty strategy. The Fuel Poverty Advisory Group also reported on this date for the first time.

Energy Efficiency

In the April 2003 Budget the Government noted that economic growth and social progress must be balanced with action to protect and improve the environment. One of the main areas in which the Government confirmed that it would be undertaking further consultation was on specific measures to encourage household energy efficiency, following on from an earlier consultation on the use of economic instruments to promote energy efficiency in the domestic sector.

Coal

Clipstone colliery closed in April 2003 and in June 2003 Betwys colliery announced closure. Output from the Selby complex began to decline prior to its proposed closure by June 2004.

Coal Investment Aid, with a budget of £60m was launched in June 2003. It is intended to create or safeguard jobs in socially and economically disadvantaged areas by encouraging coal producers to enter into commercially realistic projects that maintain access to coal reserves.

2003 (continued) **Oil and Gas**

In February 2003, to encourage a wider range of bids for offshore oil and gas exploration licences, the DTI enhanced the licensing system to include a new "promote" licence in the 21st Offshore Licensing Round. This new type of licence, offered at a tenth of the price of a traditional licence for the first 2 years of its term, was aimed at attracting smaller newcomers wishing to find oil and gas.

On 31 July 2003 the Energy Minister announced the results of the 21st Offshore Round, offering 88 new North Sea licences. The licences went to 62 companies, 27 being new entrants to the area. The awards underlined the success of the new "promote" licences, mentioned above.

In October 2003, the Energy Minister met with his Norwegian counterpart to sign an agreement on key principles that will be incorporated in a new Framework Treaty covering future cross-border oil and gas co-operation between the two countries. The Agreement opened the way for the construction of a large gas pipeline (Langeled) from Norwegian offshore infrastructure capable of delivering up to 20 per cent of the UK's current gas requirements from Winter 2006/7 and clarified the regulatory regime that would apply to a range to future cross-border projects.

In November, the Energy Minister gave approval to the giant Buzzard oil field. With an estimated 500 million barrels of oil to be recovered, and overall investment of £1.35 billion – the largest in the UK North Sea in the last decade, and equivalent to around a third of the industry total annual expenditure - Buzzard will make a significant contribution to the UK's oil production and to the economy.

Power cuts

On 14 August, a large area of the North East USA, including New York, and of Eastern Canada suffered cascading power cuts. Some 60 million people were affected within a matter of minutes as the system operators lost control of the networks, causing an uncontrolled series of power cuts.

On 28 August a power failure occurred affecting large parts of South London and parts of Kent. National Grid Transco redirected supplies via another circuit but at this time a separate fault occurred causing loss of supply to 410,000 customers. Power was restored to all customers in the space of 40 minutes.

Following power failures in London and the West Midlands, The Energy Minister asked the Engineering Inspectorate (EI) to carry out a detailed investigation of these faults, including a review of power supply arrangements for London Underground and Network Rail. In parallel with this, the EI worked on a joint investigation with Ofgem into these incidents.

Electricity

In January 2003, Powergen announced the closure at the end of March of two already partly mothballed coal-fired power stations that it had acquired from TXU in October 2002, namely Drakelow and High Marnham. International power also re-instated 250 MW at Deeside for winter 2003/04, and RWE Innogy leased Fifoots Point power station from its administrators to operate over the winter.

In May 2003, Centrica completed the acquisition of Lakeland Power's Roosecote Power Station (229 MW), which had suspended operations in November 2002. Centrica also purchased Barry Power station (250 MW) from AES in July. Scottish and Southern Energy bought the distribution network operator, Midland Electricity from Aquila Networks in July and also acquired 100 per cent of Medway power station (688 MW) in October.

Nuclear

At the end of March 2003 BNFL's Calder Hall nuclear power station closed.

2003 (continued) An agreement was signed in June 2003 allowing UK companies to start nuclear clean-up work to start in North West Russia.

During 2003 the Government and BNFL conducted a joint strategy review of the company. The review conclusions were announced in a written statement to the House of Commons on 11 December 2003. One of the key conclusions of the review was that a new BNFL parent company would be established in April 2005, the principal focus of which would be clean-up activities at UK sites. At the same time, a new group of subsidiary companies would be established which would have initial responsibility for managing clean-up and operations at BNFL's UK sites under transitional arrangements to be agreed with the Nuclear Decommissioning Authority (NDA).

On 24 June 2003, the DTI published the draft Nuclear Sites and Radioactive Substances Bill. The draft Bill set out provisions to establish the Nuclear Decommissioning Authority (NDA), as foreshadowed in the July 2002 White Paper, *Managing the Nuclear Legacy: A strategy for action*.

Renewables

Two rounds of Offshore Licensing took place in 2003, which brought forwards a large number of proposals. Capital grants of £59 million were given to six of the first round offshore wind projects, with a total capacity of around 530 MW. The awards made in the second round, which covered 15 wind farm projects, will provide enough electricity for more than one in six households (4 million homes). The projects are in three strategic areas (Thames Estuary, Greater Wash and North West) with generation due to begin 2007-08. North Hoyle – the UK's first major offshore windfarm – began generating electricity.

2002

Climate Change levy

In the Chancellor's 2002 Budget statement he strengthened the existing policy to support business energy efficiency by announcing proposals to:

- Freeze the climate change levy rates;
- Give complete exemption from the climate change levy to electricity generated by good quality combined heat and power (CHP) or from coalmine methane. Implementations of these exemptions are subject to EU state aids approval;
- Add heat pumps, radiant, warm air and solar heaters, energy-efficient refrigeration equipment and compressor equipment to the list of energy-saving technologies, which can benefit from enhanced capital allowances against tax. This provision is also to be extended to equipment for leasing.

Emissions Trading Scheme

The Government's emissions trading scheme was launched on 2 April 2002. Thirty-four organisations successfully bid to join the scheme for permits in an auction for permits held on 11 –12 March 2002.

Energy Efficiency

The Energy Efficiency Commitment is an obligation (expressed as a total energy saving in TWh) placed by the Government on gas and electricity suppliers to encourage and assist their customers to make energy savings through measures such as cavity wall insulation, loft insulation, boiler replacement and energy saving light bulbs. Suppliers make a contribution to the cost of the measure at a level that will induce the customer to take it up.

2002 (continued) The scheme, began on 1 April, and will run from 2002 to 2005. The overall target on all suppliers has been set at a level that is expected to lead to estimated ongoing annual energy savings for consumers of around £275 million by 2005, as well as annual reductions in carbon emissions of around 0.4 million tonnes by 2005. It is estimated that the scheme will cost energy suppliers around £3.60 per customer, per fuel, each year. The scheme focuses help on the fuel poor and companies will be required to seek at least 50 per cent of their target fuel savings from disadvantaged customers.

Fuel Poverty

The Fuel Poverty Advisory Group, which had been announced in the November 2001 UK Fuel Poverty Strategy, met for the first time in March 2002. The Group is an Advisory Non-Departmental Public Body sponsored by DEFRA/DTI. Its primary task is to report on the progress of delivery of the Government's Fuel Poverty Strategy and to propose and implement improvements to regional or local mechanisms for its delivery.

The Group consist of a chairman and senior representatives from organisations such as the energy industry, charities and consumer bodies. These members would be representative ex officio members rather than individuals, who should be able to take a broad and impartial view.

In March 2002, the Department for Transport, Local Government and the Regions published revised guidance on the decent home standard and how social landlords can quantify the extent of non-decent housing within their stock to help them better deal with the problem. A decent home is one that meets the following criteria:

- is above the current statutory minimum standard for housing;
- is in a reasonable state of repair;
- has reasonably modern facilities and services;
- provides a reasonable degree of thermal comfort.

The Scottish Executive issued its draft Fuel Poverty Statement in March 2002, inviting comments on the way the Executive plans to tackle fuel poverty in Scotland.

Again in March, Ofgem published its second annual report on its Social Action Plan setting out progress towards Ofgem's aim to ensure competition benefits all customers and to develop polices to help the fuel poor.

Coal

Longannet colliery owned by the Scottish Coal Company Ltd ceased operation and went into liquidation in March 2002. Price of Wales Colliery closed in August 2002.

Oil and Gas

PILOT "Progressing Partnership" Work Group was launched in March 2002. Within PILOT, the joint Government/Industry oil and gas task force, a new initiative for progressing partnership was born. Looking at common behavioural and supply chain barriers, the Group's aim was to address issues inhibiting recovery of Britain's oil and gas reserves. This led to a number of new initiatives, including getting "fallow" assets into the hands of those companies best placed to exploit them, and streamlining commercial agreements, to allow for swifter transfer of licence interests in offshore acreage.

Gas and Electricity

In October, TXU Europe agreed to sell its UK assets, including 5.3 million electricity and gas customers and 2.9GW of capacity to Powergen for £1.37 billion. The sale made Powergen the second largest supplier of retail energy behind Centrica.

2002 (continued) **Electricity**

London Electricity acquired the distribution business of Eastern Electricity and the distribution and retail businesses of Seeboard.

In March 2002 Fifoots Point coal fired power station owned by AES went into receivership followed by Lakeland Power's Roosecote station in November 2002 and Westfield's Fife Power in December 2002

Power stations mothballed during 2002 included: one unit at Deeside (International Power); one unit at Killingholme (Powergen); and two units at Grain (Powergen).

Nuclear Power: British Energy

Following a sudden deterioration in its financial situation, the private sector nuclear electricity generator, British Energy (BE) approached the Government in early September 2002 seeking immediate financial support and discussions about longer term restructuring. The company owns eight nuclear power stations and generates about 20 per cent of Britain's electricity. In accordance with the Government's overriding priorities of nuclear safety and the security of electricity supplies, it provided short-term financial support to, and entered into discussions with, BE.

BE announced a proposed restructuring plan on 28 November, and the Government is taking financial responsibility for BE's historic spent fuel liabilities, and underwriting new arrangements announced by the company to fund decommissioning and other nuclear liabilities.

Nuclear

Bradwell power station owned by BNFL Magnox ceased production after 40 years of service.

On 4 July 2002, the Government published proposals for radically altering existing arrangements for managing publicly-funded nuclear clean up in its White Paper, *Managing the Nuclear Legacy: A strategy for action*. The cornerstone of the new policy involved the establishment of a Nuclear Decommissioning Authority (NDA) to ensure the safe, secure, cost-effective and environmentally friendly decommissioning and clean up of the twenty nuclear sites currently operated by BNFL and UKAEA. To this end, it will develop a UK-wide strategy for dealing with the nuclear 'legacy'. Public consultation on the White Paper ended on 14 October. Detailed provisions to establish the NDA were later published in the draft Nuclear Sites and Radioactive Substances Bill on 24 June 2003.

CHP

In the 2002 Budget it was announced that all CHP generated electricity would be exempt from the Climate Change Levy (CCL). This is a key measure that is likely to help set the sector on course to meet the Government's target of at least 10,000MWe of CHP capacity by 2010. Previously, only CHP electricity used on site or sold direct to other users had qualified for CCL exemption. In addition leased assets became be eligible for Enhanced Capital Allowances (ECAs).

In May 2002, Defra published for consultation the draft CHP Strategy that describes the full range of measures thought sufficient to for the Government's target of at least 10,000 MWe of Good Quality CHP to be met by 2010. It included market incentives, guidance and information, financial assistance and legislative action to support growth of the CHP industry. The consultation ran between 15 May and 7 August. A summary document was published on the Defra website in November. The final Strategy will be published in 2003.

2002 (continued) **Micro CHP**

In the 2002 Budget it was announced that domestic micro CHP installed under the Warm Front Team will attract the reduced rate of VAT. Micro CHP is a new technology that we expect to make a significant contribution to domestic energy efficiency in the future. Reducing VAT on the cost of installation will help to give this new technology a useful kick-start.

Renewables

On 1 April 2002, the Government introduced an obligation on all licensed electricity suppliers that required them to supply a specified proportion of their electricity from eligible renewable sources. That proportion will rise in stages from 3 per cent in the 2002 year to 10 per cent by 2010.

During the year the first two offshore windfarms were approved and construction began at Scroby Sands and North Hoyle.

2001

Environment

The Government introduced the climate change levy in April 2001. The levy had been proposed in the 1999 Budget, and its design elaborated in subsequent announcements.

The levy applies to energy (coal, gas and electricity) supplied to business and the public sector. It does not apply to energy used in the domestic sector for motive power in transport or to produce another energy product. There are exemptions for electricity generated from renewable sources and energy from quality-assured Combined Heat and Power (CHP) plants.

Levy revenues are recycled to business through an accompanying cut in employers' National Insurance contributions and a package of energy support to business which will fund energy efficiency advice to business and investment in low carbon technologies research and development, to be managed under the new Carbon Trust; as well as a new scheme of enhanced capital allowances for businesses investing in energy saving technologies.

Energy intensive sectors, as defined under certain eligibility criteria, receive an 80 per cent levy discount in return for delivery of energy saving targets in negotiated agreements with the Government.

The Government worked closely with the business-led Emissions Trading Group to design a UK Emissions Trading Scheme and published a draft Framework in May 2001, providing guidance for business on how the scheme will work and how companies can join in. The Government had previously confirmed it would make £30 million (net of tax) available to encourage companies to bid into the scheme and take the risks associated with taking on a binding emissions cap.

Fuel Poverty

In February, the Government published its consultation draft of the UK Fuel Poverty Strategy. Following a period of consultation over the summer in 2001, the UK Fuel Poverty Strategy was then published in November of 2001. The document sets out the Government's objectives, policies and targets for alleviating fuel poverty in the UK over the next 10 years.

The Government announced two new pilot schemes in the November 2002 Strategy. The Government intends to invite micro-CHP manufacturers to take part in a large-scale pilot to test the suitability of the technology for fuel poor households. In total up to 6,000 installations will be carried out over a 3-year period beginning in 2002. If successful, the intention is to offer this through HEES/WFT from 2005.

2001 (continued) The Government also announced its intention to carry out a £5 million pilot to test a range of renewable energy and related technologies for use in homes that are off the mains gas network. Technologies for consideration include ground, air and water source heat pumps, solar water heating, biofuel heating, wind or hydroelectric generation. Individual pilots would examine the most appropriate renewable energy solutions for various property types, locations and occupant groups.

Following the publication of the draft Strategy in February 2001, a Group was set up to look at the feasibility of extending the gas network to ensure that wherever possible the gas network provides the widest viable coverage and fullest viable capacity. The Group reported to Ministers at the end of 2001, the reports key findings were:

- around 1.3 million of the 4.5 million British households in fuel poverty are without access to mains gas. Of 900,000 English households without gas, provision of gas central heating and, where practical, loft and cavity wall insulation could remove 600-700,000, including the great majority of the most vulnerable, from fuel poverty. Similar or greater impacts would be likely in Wales and Scotland;
- extension of the network may be particularly appropriate where certain conditions –size of community, density and clustering of housing and relatively close proximity to the existing network – coincide. Where connection to the network is inappropriate, similar results appear obtainable from insulation and central heating systems used in conjunction with other fuels, such as fuel oil, that can drive central heating radiators;
- in some cases, other measures may be enough to remove households from fuel poverty: electric storage heating and insulation would remove 300-400,000 from fuel poverty, while insulation measures alone would remove 200-300,000.

Coal

Quinquennial Review of the Coal Authority completed. RJB Mining became UK Coal in May.

In October 2001 Coalpower Ltd assumed ownership of Hatfield colliery, which had gone into liquidation in August.

Buzzard Oil Field Discovery

In June 2001 the then PanCanadian Petroleum Company announced it had made a major oil reservoir discovery in the Central North Sea called “Buzzard”. Initial estimates of recoverable oil were set at 200 to 300 million barrels. Later research indicated that the original reserves figure was understated by 100 million barrels of oil recoverable. The discovery confounded the view that there were no more large fields to be discovered in the North Sea.

Oil

In August 2001 production of gas and oil began at the Franklin field from a North Sea record depth of 5,500m (18,000 ft) sub sea and at record high temperature of 200 degrees Celsius. The Elgin-Franklin field complex became the world’s largest offshore high-pressure high temperature producing centre.

Electricity

On 27 March the new electricity trading arrangements (NETA) replaced the electricity pool. NETA is a screen-based trading arrangement similar to that for general commodity trading – see Chapter 5, paragraph 5.3. A number of reports and consultations were carried out following the introduction of NETA - focussing in part on the impact of the balancing and settlement mechanism on small generators.

In October 2001, the formal separation of supply and distribution licences took place. From that date, no company could legally hold both licences. All former public electricity suppliers created new company structures to cater for this requirement. In addition several companies took the opportunity to focus on either supply or distribution by selling off the other business.

2001 (continued) By the end of the year, Innogy (the demerged domestic arm National Power) owned the former supply businesses of Midlands Electricity, Yorkshire Electricity and Northern Electric; TXU Europe owned the supply businesses of the former Eastern Electricity and Norweb; London Electricity owned the supply business of SWEB as well as that of London, and Scottish and Southern Electric owned the supply businesses of Scottish Hydro, Southern Electric and SWALEC. (Scottish Power continued to own Manweb as well as that of Scottish Power). In the field of distribution, Western Power Distribution (the renamed distribution business of SWEB) acquired the distribution business of SWALEC while Northern Electric purchased the distribution business of Yorkshire Electricity.

In October 2001, American Electric Power bought Ferrybridge and Fiddlers Ferry coal fired power stations from Edison Mission Energy.

TXU Europe sold the Rugeley coal fired power station to International Power (July), the West Burton coal fired station to the London Power Company (December), and the Kings Lynn and Peterborough CCGT stations to Centrica (October).

Nuclear

On the 28 November 2001 the Secretary of State made a statement about the future management of public sector civil nuclear liabilities. She announced HMG's intention to set up a Liabilities Management Authority (LMA) responsible for Government's interest in the discharge of public sector civil nuclear liabilities. The establishment of the LMA, and the transfer of assets and liabilities from BNFL and UKAEA to it, will require primary legislation.

2000

Fuel Poverty

In the March 2000 Budget the Government announced a change in tax rules to facilitate BG Transco's Affordable Warmth Programme, which uses an innovative application of lease finance, to encourage the installation of insulation and gas central heating. This programme aimed to install central heating in 850,000 local authority/registered social landlord homes and 150,000 pensioners private sector homes over the subsequent seven years.

After extensive consultation Ofgem, published its Social Action Plan in March 2000. It is a framework for action across a wide range of activities to ensure that the economic benefits of liberalisation is re spread fully among vulnerable and disadvantaged customers.

The new Home Energy Efficiency Scheme (HEES) was launched in June 2000 to provide a package of insulation and/or heating improvement measures for households in receipt of an income or disability benefit. The scheme will have a total budget of nearly £300 million in the first two years.

The Fuel Poverty Monitoring and Technical Group, which includes representatives from across Government as well as external organisations, was set up in June 2000. It is responsible for the development of a suite of indicators for monitoring progress on tackling fuel poverty.

The Warm Homes and Energy Conservation Act, introduced by David Amess with Government and cross party support, became law in November 2000. The Act requires the Secretary of State for England and the National Assembly for Wales 'to publish and implement a strategy for reducing fuel poverty and set targets for its implementation'.

Utility Reform

Utilities Act 2000 enacted in June.

2000 (continued) **Gas**

In October, BG plc de-merged into two separate listed companies, of which Lattice Group plc is the holding company for Transco and BG Group plc includes the international and gas storage businesses.

Electricity

In March National Power sold Eggborough power station to British Energy and Killingholme CCGT station to NRG. London Electricity purchased the Sutton Bridge CCGT station.

In April, the Secretary of State for Trade and Industry announced that he anticipated lifting the restrictions on the building of new gas-fired power stations, once new electricity arrangements were in place. This moratorium was lifted on 15 November.

In August, AES' new coal fired station at Fifoots Point began to generate.

In September, PowerGen sold its Cottam power station to Edf.

Energy Efficiency

In July 1999, the Regulator announced his intention to raise the level of Energy Efficiency Standards of Performance (EESOP), which obliges electricity supply companies to improve energy efficiency amongst their domestic consumers, from £1.00 to £1.20 per customer with effect from April 2000. He also announced his intention to extend EESOP obligations to gas supply companies, also at a rate of £1.20 per customer.

The Utilities Act received royal assent and enabled future EESOP obligations to be set by the Government. The Government had previously indicated such an intention explaining that it was appropriate for the Government rather than the Regulator to decide social and environmental obligations that had significant financial cost. In March 2000, the Government published a consultation document, "Energy Efficiency Standards of Performance 2002-2005" seeking views on the format and level of a new EESOP, and in November, published its provisional conclusions and announced the re-naming of the obligation as the Energy Efficiency Commitment (EEC).

In November 1999, the Government launched its Good Quality CHP Standard and confirmed its target of achieving at least 10,000 MWe of CHP capacity by 2010: more than double current capacity. In December, the Government confirmed that electricity from CHP plants would be exempt from the Climate Change Levy where the electricity was used on site or sold direct to the consumers.

Coal

At the end of January 2000 Midlands Mining ceased to produce coal from its only remaining colliery, Annesley-Bentinck. It ceased to sell coal in June.

On 17 April 2000, the Secretary of State announced a coal subsidy scheme designed to assist UK coal producers through a difficult transitional period arising from adverse market conditions and the imminent relaxation of the stricter gas consents policy. The Government's objective was to enable those elements of the industry with a viable future without aid to overcome short-term market problems. The subsidy scheme had to be approved by the European Commission, which was obtained in November 2000. Under the scheme, producers of qualifying coal are reimbursed for losses they incur on coal produced between April 2000 and July 2002, provided they can demonstrate long term viability and meet other conditions designed to avoid market distortions.

Oil

January 2000: establishment of PILOT, to take over the work of the Oil and Gas Industry Task Force and give effect to the Task Force's recommendations.

2000 (continued) September 2000: signature and publication of Memorandum of Understanding between Government, oil industry, hauliers, trade unions and police to ensure continued supply of fuel in the event of any further disruption by fuel protestors.

New and Renewable Energy

In February the Government published *Conclusions in Response to the Public Consultation* ("New and Renewable Energy: Prospects for the 21st Century"). The document summarised the Government's strategy to make progress to a target of 10% of UK electricity from renewables sources by 2010, subject to the cost to consumers being acceptable.

In May the European Commission adopted a proposal for a Directive on the promotion of electricity from renewable energy sources in the internal electricity market. The Directive itself is to be agreed during 2001.

Nuclear

In February, HSE published three reports into BNFL, covering

- The Storage of Liquid High Level Waste at Sellafield.
- Falsification of Data at the Mox Demonstration Facility.
- Team inspection of the Control and Supervision of Operations at Sellafield.

In March the Government announced that it considered that the earliest date possible for the introduction of any PPP into BNFL could not be before the latter part of 2002.

In April BNFL published its response to two of the HSE reports, with the third response to follow in the summer as agreed with HSE.

In May BNFL acquired the nuclear business of ABB. BNFL also announced a strategy for managing lifetimes of its Magnox stations. BNFL also closed its Hinkley Point Magnox station.

In June BNFL's Wyfla station went offline for extended repairs and maintenance that was to last until August 2001.

On 1 September 2000, the UKAEA's Directorate of Civil Nuclear Security was transferred to the DTI as the Office for Civil Nuclear Security (OCNS), to regulate security within the civil nuclear industry. It will have operational and regulatory autonomy within DTI.

Environment

Royal Commission on Environmental Pollution report on climate change and energy

In June, the Royal Commission on Environmental Pollution published its major report "Energy - the changing climate". It referred to the need for much greater international action if concentrations of greenhouse gases were to be stabilised. It emphasised the need for a long term vision of how large scale reductions in greenhouse gas emissions, of the order of 60% of carbon dioxide emissions by 2050, might be achieved.

Climate Change Programme

The Government published in November its national Climate Change Programme. The Programme aimed to provide a strategic framework for the Government to deliver the UK's target under the Kyoto Protocol of reducing emissions of a basket of six greenhouse gases by 12.5% from 1990 levels in the period 2008-12; and also to move towards its own domestic policy goal of reducing carbon dioxide emissions by 20% from 1990 levels by 2010. The Programme drew together a wide range of existing and planned policies and measures, to engage all sectors of the economy and society in efforts to reduce greenhouse emissions. Many of these had implications for the energy sector.

1999

Nuclear

The Government announced that it was looking to introduce a Public Private Partnership (PPP) into BNFL, subject to the company's overall progress towards achieving targets on safety, health, environmental and business performance as well as further work undertaken by the DTI and its advisers. The Government's working assumption was that PPP would involve BNFL as a whole. Existing legislation provided for the sale of up to 49 per cent of the company.

BNFL, in partnership with US engineering group Morris Knudsen, acquired the global nuclear business of the US company Westinghouse.

Following Government approval, BNFL commenced uranium commissioning of its Sellafield mixed oxide (MOX) fuel plant.

Electricity

Opening of supply market to full competition was completed in May. At the end of June, Ferrybridge and Fiddlers Ferry power stations were sold by PowerGen to Edison Mission Energy, and at the end of November National Power sold DRAX to AES.

The implementation date for the EU Electricity Liberalisation Directive was February 1999, which required an initial 25 per cent market opening to be implemented, with nearly all the Member States adhering to the timetable.

In October 1999, the Director General of Gas and Electricity supply (DGGES) published a report on Pool Prices. This concluded that the trading arrangements facilitated the exercise of market power. He proposed the introduction of a good market behaviour condition in the licences of the main generators.

New and Renewable Energy

In March 1999, a third Scottish Renewables Order (SRO) was made for 150 MW (DNC) of capacity.

In March 1999, the Government published a consultation paper "New and Renewable Energy - Prospects for the 21st Century". The legal provision for a new renewables mechanism was the Utilities Bill announced in the Queen's speech in November 1999.

Coal

In March 1999, the Government issued mineral planning guidance with respect to opencast mining.

In April 1999, the Department published its policy paper Energy Paper 67 on research and development into cleaner coal technologies.

In July 1999 Calverton Colliery closed.

In October 1999, the Government's Coal Field Task Force published a progress report relating to the problem of those communities affected by pit closures.

Utility Regulation

New name for the combined OFFER and Ofgas electricity and gas market regulator announced as Office of Gas and Electricity Markets - OFGEM.

In April, in its response to consultation, the Government confirmed its plans to establish independent consumer councils.

In July, the Government issued a discussion note on "The Government's Provisional Conclusions on how Energy Efficiency Standards of Performance under the proposed legislation for utility regulation could work".

1999 (continued) In November 1999, the Government announced a Utilities Reform Bill to provide a new framework for the regulation of the gas and electricity markets so as to provide a fair deal to consumers.

Fuel Poverty

The Electricity Association Fuel Poverty Task Force was set up in May 1999 to bring forward energy related proposals to help alleviate fuel poverty. The task force comprises representatives from both gas and electricity customers.

In November 1999, an Inter-Ministerial Group on Fuel Poverty was set up to take a strategic overview of the relevant policies and initiatives with a bearing on fuel poverty, and to develop and publish a UK Strategy setting out fuel poverty objectives, targets and the policies to deliver those objectives.

Gas

In June, BG announced its restructuring to separate Transco, the regulated pipeline company, from the rest of the business.

A consultation exercise into the Fundamental Review of Gas Safety was launched by the Health and Safety Executive.

In September 1999, the HSE issued a consultation document outlining the proposed amendments to "The Gas Safety (Management) Regulations (GS (M) R)", with a closing date for December 1999.

Environment

In the March 1999 Budget, the Government announced its intention to introduce a climate change levy on the supply of energy to business, following up recommendations of the Marshall Report.

The Government also followed up Lord Marshall's recommendations on emissions trading, by encouraging the launch of an industry-led project to design a pilot scheme for the UK.

Oil

16th February 1999, the key Brent crude oil benchmark price touched \$9 per barrel, a record low level. However, by December 1999 the oil price had recovered to over \$25 a barrel.

Production from the UKCS reached a record level of 137 million tonnes of oil.

Drilling at BP Amoco's Wytch Farm onshore field achieved two world records - longest production well drilled and greatest horizontal drilling distance achieved.

Oil & Gas industry Task-Force report published in September 1999 set a vision for the UKCS in 2010, aimed at increasing investment in UKCS activity, increasing employment in directly linked and related industries, and prolonging UK self-sufficiency in oil and gas.

1998

Coal

The 5-year contracts with the electricity generators ended in March 1998.

Silverdale Colliery closed in December 1998.

Electricity

The final stage of opening electricity supply markets began in September and was completed in May 1999.

1998 (continued) The Government published a White Paper (CM 4071) on energy sources for power generation, and adopted a more restrictive policy towards consents for new power stations, but with special provisions for CHP.

The Monopolies and Mergers Commission recommendation on revised transmission and distribution price control on Northern Ireland Electricity, which was subject to judicial review, was upheld by the Northern Ireland Court of Appeal.

Gas

Introduction of supply competition in Great Britain was completed in May 1998.

In April, the gas levy was reduced to zero.

The European Union Gas Liberalisation Directive entered into force in August 1998.

In October, the UK - Belgium interconnector became operational, providing a path for UK gas exports to markets in Europe as well as another route for imports of gas into the UK.

Revision of Frigg Treaty with Norway was signed in August 1998.

New and Renewable Energy

The fifth Non-fossil fuel obligation (NFFO) Order was laid in September 1998 for 1,177 MW of capacity.

Oil

International agreement reached on decommissioning and disposal of offshore structures.

New Regulations required Environmental Impact Assessments for offshore projects.

200 oil and gas fields in production in the UK.

Nuclear

In January, the Government transferred its shareholding in Magnox Electric to BNFL as the first stage of a merger of the two companies. Full integration of the combined business of the two companies was completed early in 2000.

The Health and Safety Executive and the Scottish Environment Protection Agency completed a full audit of safety at UKAEA Dounreay.

The acceptance of a small consignment of uranium from Georgia for non-proliferation reasons was subject to scrutiny by the Trade and Industry Committee, who approved of the Government's decision.

Utility Regulation

In March, following an inter-departmental review, the Government published a Green Paper entitled 'A fair deal for consumers' on utility regulation aimed at ensuring that consumers got a fair deal from regulation, and at making regulation more consistent, transparent, and accountable. The Government's conclusions, in the light of consultation, were published in July, including confirmation that the regulators for gas and electricity should be merged and that the Electricity Act 1989 should be amended to require the distribution businesses of the PESs to be licensed separately from their supply businesses. Detailed proposals on energy and the creation of independent consumer councils were published in November.

In October, the Government published its consultation document on "Possible Provisions for Energy Efficiency Standards of Performance in the New Framework of Utility Regulation".

1998 (continued) A new gas regulator was appointed in November 1998; he also took over as electricity regulator in January 1999.

1997

Regulation

In June, the Government announced a review of utility regulation, to cover in particular electricity, gas, telecommunications, and water. It was aimed at ensuring that consumers get a fair deal from regulation, and at making regulation more consistent, transparent and accountable.

Electricity

Revised Transmission Price control took effect from 1st April reducing prices further over four years.

In October, the Government announced a review of the electricity trading arrangements including the Electricity Pool. OFFER were asked to report by July 1998.

In December, the Government announced a review of fuel sources for power stations. A consultation paper was issued in June 1998.

The Regulator announced a proposed timetable starting in April 1998 for the rollout of the final stage of supply competition using customer postcodes. The Regulator subsequently modified the timetable and put in place arrangements for the extensive testing of the systems necessary to make competition work.

Gas

Following the increased expenditure on exploration and development of gas fields in the North Sea in the early 1990s, gas production increased to the point where the UK became a net exporter of gas for the first time.

By March competition in the domestic market was extended to include another 0.5 million households in Avon and Dorset and 1.1 million households in the South East of England, bringing the total to two million customers. Over 20 per cent of these households switched to a new supplier by the end of 1997.

In November 1997, as part of the next stage in the liberalisation of the gas industry, competition was extended to another 2.5 million domestic customers in Scotland and North East England.

Nuclear

On 1 April 1997, the Fossil Fuel Levy in England and Wales was reduced to 2.2 per cent (from 3.7 per cent in November 1996).

New and Renewable Energy

The fourth Non Fossil Fuel Obligation (NFFO-4) Renewables Order for England and Wales made for 873 MW Declared Net Capacity (DNC).

The second Scottish Renewables Order (SRO-1) was made for 112 MW of capacity.

John Battle, Minister for Science, Energy and Industry, announced a review of renewables energy policy on 6 June 1997.

VAT

On 1 September, VAT on domestic gas and electricity supplies was reduced to 5 per cent.

1997 (continued) Windfall tax

In the July Budget, the Government announced that the privatised utilities would have to pay a one-off windfall tax on the excessive profits they had made, payable in two instalments - one in 1997 and the other in 1998. Altogether this was expected to raise £5.2 billion.

Winter Fuel Payments

Winter Fuel Payments were introduced in the winter of 1997 for Great Britain (a similar scheme existed in Northern Ireland). Everyone over the age of 60 received the payment, regardless of whether they are getting a state Pension or any other social security benefits.

Oil

November 1997 saw the start of production of oil from the Foinaven field. This was the first production from the British area of the Atlantic Margin known as the West of Shetland.

1996

Coal

In January the company Coal Investments ceased trading, closing four pits and selling two to Midlands Mining Ltd.

In May the National Audit Office published its report into the privatisation of British Coal's mining activities.

Electricity

The revised Distribution Price control (further tightened as a result of the second review in 1995) took effect from 1st April.

In July 1996 Eastern Group leased a total of 6 GW of coal-fired electricity generation capacity from National Power (4 GW) and PowerGen (2 GW). As a result, the pool price cap was lifted.

Bids made by National Power and Powergen for Southern Electric and Midlands Electricity respectively in 1995, which would have allowed significant vertical integration between generation and supply in the industry, were prohibited by the President of the Board of Trade in April following an investigation by the Monopolies and Mergers Commission.

Gas

On 6 February in response to the separation of licensing for gas distribution and supply in the Gas Act 1995, British Gas Plc announced it was demerging into two companies, one responsible for the transmission of gas (BG Transco) and one for the supply of gas (Centrica).

On 1st April, the first stage of the introduction of competition in the domestic market began - around 540,000 customers in South West England were enabled to purchase their gas from a variety of suppliers. By the end of the year just under 20 per cent of households switched to a new supplier, whose prices were on average 10-20 per cent less than those charged by British Gas.

1996 (continued) **Nuclear**

The nuclear generating industry was formally restructured on 31 March 1996 in preparation for privatisation. A holding company, British Energy plc (BE) was created, together with two subsidiary companies - Nuclear Electric Ltd, (now called British Energy Generation) which now operates the PWR and five AGR stations in England and Wales, and Scottish Nuclear Ltd (now called British Energy Generation UK), which operates two AGR stations in Scotland. In July 1996 British Energy, which operates the AGR/PWR nuclear electricity power stations in the UK was floated on the London Stock Exchange by the Government. Magnox stations remained in the public sector under the ownership of Magnox Electric plc. Magnox Electric and BNFL merged early in 2000.

Because of the privatisation of British Energy, on 1st November, the Fossil Fuel Levy in England and Wales was reduced from 10 per cent to 3.7 per cent (on 1st April 1997 it was reduced further to 2.2 per cent).

The premium element of prices payable in Scotland under the Nuclear Energy agreement ended in July 1996. A new Fossil Fuel Levy was introduced at a rate of 0.5 per cent to support renewable energy.

In September, AEA Technology, the commercial arm of the UK Atomic Energy Authority, was privatised.

Regulation

On 10th June, the Office for the Regulation of Electricity and Gas (OFREG) was formed to perform a similar role in Northern Ireland to that of OFFER and OFGAS in England and Wales. It was unique in that it was the only combined utility regulatory office in the UK.

1995

Coal

The Domestic Coal Consumers Council was abolished.

Electricity

In March, the Government's 'Special Share' in each of the Regional Electricity Companies expired. The companies were then exposed to the full disciplines and opportunities of the market, including acquisitions and mergers. In 1995 there were four bids involving Regional Electricity Companies, followed by a further seven successful bids in 1996 and two more in the first half of 1997.

In March, the Government also floated its remaining 40 per cent share in National Power and PowerGen on the London Stock Exchange. It did, however, retain its 'special share' in these companies.

Following a review, the distribution price control was revised from 1st April.

The DGES decided to review again the Distribution Price Control following Northern Electric's defence against a take-over bid from Trafalgar House.

The National Grid Company was floated on the London Stock Exchange in December. As a result, customers of the Regional Electricity Companies received a discount of £50 on their electricity bills in early 1996 as their share of the benefit from the sale. Before the company was floated, its Pumped Storage Business was transferred to a new company, First Hydro, which was then sold to a US generator, Mission Energy.

The Government still holds a special share in the National Grid Company which is not time limited.

1995 (continued) **Gas**

The Gas Act 1995 set out the Government's plans for the liberalisation of all gas markets, including the domestic sector. The Government and the industry put into place the licensing framework and the administrative/computer framework required to support the forthcoming gas pilot trials.

By the end of 1995, there were 40 independent gas marketing companies selling gas to UK end-users. They had captured 80 per cent of the firm industrial and commercial market, and 70 per cent of the market for "interruptible" sales.

The development of a "gas bubble" (an excess of supply over demand) in 1995 and into 1996 led to a sharp fall in the spot price of gas from 0.7p/KWh to around 0.4p/KWh (10p per therm). The main beneficiaries of this were customers on short-term gas contracts.

Oil

Production from the UK sector of the North Sea and onshore sites reached a new record level of output at 130.3 million tonnes per annum.

Nuclear

In February, electricity generation began at Sizewell B, the UK's only pressurised Water Reactor, whose construction had been completed the previous year.

In May, the Government published a White Paper on the prospects for nuclear power in the UK. It concluded that nuclear power should continue to contribute to the mix of fuels used in electricity generation, provided it maintained its current high standards of safety and environmental protection; that building new nuclear power stations was not commercially attractive; and that there was no justification for any government intervention to support the construction of new nuclear stations.

Energy Conservation

The Home Energy Efficiency Act 1995 (HECA) requires all UK local authorities, with housing responsibilities, to prepare an energy conservation report, identifying practicable and cost-effective measures to significantly improve the energy efficiency of all residential accommodation in their area; and to report on progress in implementing the measures.

1994

Coal

Coal Authority was brought into legal existence under Section 1 of the Coal Industry Act 1994 on 19th September.

The 31st October was the Coal Authority "Restructuring Date". Ownership of Britain's coal reserves was transferred to the Authority and it assumed its full range of functions including powers to license coal operations.

In December, British Coal Corporation's mining activities were sold to the private sector.

Electricity

In April, competition in the electricity market was extended to include all customers whose demand exceeded 100 kW.

From 1 April the revised (tightened) supply price control took effect.

1994 (continued) OFFER imposed the first Energy Efficiency Standards of Performance (EESOPs) on electricity companies, requiring them to promote and carry out energy efficiency measures for their customers. At the same time OFFER included within the price controls a charge of £1 per customer per year to pay for the measures. This first EESOP covered the period 1994-1998, but was subsequently extended, at the same level, until March 2000.

New and Renewable Energy

The third Non Fossil Fuel Obligation (NFFO-3) Renewables Order for England and Wales was made for 627 MW Declared Net Capacity (DNC).

The first Scottish Renewables Order (SRO-1) for Scotland was made for 76 MW Declared Net Capacity (DNC).

The first Northern Ireland NFFO (NI-NFFO-1) Renewables Order was made for 16 MW Declared Net Capacity (DNC).

VAT

In April, the Government introduced VAT on domestic fuel at a rate of 8 per cent.

1993

Coal

Coal Review White Paper, "The Prospects for Coal", published on 23rd March. Main conclusions were:

- subsidy to be offered to bring extra tonnage down to world market prices,
- no pit to be closed without being offered to the private sector,
- no changes to the gas and nuclear sectors,
- increased investment in clean coal technology,
- regeneration package for mining areas increased to £200 million.

On 2nd December, the Coal Industry Bill was published. Its main features were:

- to enable privatisation,
- to establish the Coal Authority,
- to protect the rights of third parties,
- to safeguard pension and concessionary fuel entitlements
- to retain HSE and HM Mines Inspectorate as bodies responsible for mine safety & inspection.

Electricity

In June, Northern Ireland Electricity plc was floated on the London Stock Exchange.

Gas

The Monopolies and Mergers Commission published a report on competition in gas supply.

Oil

Unleaded petrol sales accounted for 50 per cent of the total UK market for motor spirits.

1992

Electricity

In March, generation in Northern Ireland was transferred from Northern Ireland Electricity to four independent generation companies. Northern Ireland Electricity plc became responsible for transmission and distribution and supply. A special share was retained in Northern Ireland Electricity.

Gas

Following the withdrawal of BG's legal monopoly relating to the non-tariff or contract market for customers with demand greater than 25,000 therms per annum, British Gas was prompted in March by the Director General of Fair Trading to create the conditions whereby competing suppliers should be able to supply at least 60 per cent of the market for customers whose demand exceeded 25,000 therms. In August, the market sector open to competition was extended to include customers with an annual demand of between 2,500 and 25,000 therms. The agreement between British Gas and the Director General of Fair Trading was then redefined as 45 per cent of the market for demand greater than 2,500 therms per annum.

1991

Electricity

60 per cent of the shares in National Power and PowerGen were floated on the London Stock Exchange in March. The Government retained the remaining 40 per cent of shares. Scottish Power and Scottish Hydro Electric were floated in June. The Government retained ownership of Nuclear Electric. In England and Wales the long-term costs of generation from nuclear sources were funded from the proceeds of the "Fossil Fuel Levy" on supplies of certain electricity. In Scotland contracts were established with the Scottish PESs for the output of the Scottish nuclear generating stations.

New and Renewable Energy

The second Non Fossil Fuel Obligation (NFFO-2) Renewables Order for England and Wales was made for 457 MW Declared Net Capacity.

Oil

The Gulf War began in mid-January and ended in late February, following the occupation of Kuwait by Iraq in August 1990. This provoked worldwide concern about the availability of oil. The annual average price of crude oil rose sharply, and took two years to settle back to its pre-war level.

One hundred oil and gas fields were in production in the UK.

1990

Electricity

The new licensing regime for electricity companies was established along with the post of Director General of Electricity Supply (DGES) by the 1989 Electricity Act. The Act also gave powers to the Secretary of State for Trade and Industry to replace existing public electricity boards by Plc's. The Office of Electricity Regulation (Offer now merged with OFGAS to form OFGEM) set up in shadow form.

Provisions of the Act came into force in March. The Central Electricity Generating Board (CEGB) was split into four companies, National Power and PowerGen (fossil fuel generation), Nuclear Electric (nuclear generation) and the National Grid Company (NGC) (transmission). Twelve Regional Electricity Companies replaced the Area Electricity Boards. At the same time, the South of Scotland Electricity Board and North of Scotland Hydro-Electric Board was replaced by Scottish Power and Scottish Hydro-Electric (generation, transmission, supply and distribution) and Scottish Nuclear (nuclear generation). The ordinary shares in the National Grid were transferred to the 12 Regional Electricity Companies (RECs).

At vesting, (31 March) price controls, put in place by the Government, came into being for the transmission business of NGC and the supply and distribution businesses of the RECs. There was not a generation price control as this sector was open to competition from the start.

1990 (continued) The 12 Regional Electricity Companies in England and Wales were floated on the London Stock Exchange in December. The Government retained a special share in each of the privatised companies, known as the 'Special Share', which prevented any other investor from buying more than 15 per cent of the shares for a period of five years.

At the same time the market for customers with demand exceeding 1 MW was opened up to competition.

During 1990 the Electricity Pool was established. This was a trading mechanism (now superseded), which called generators online to provide a "pool" of electricity for suppliers to purchase. Other than for a few very large contracts, there were no direct contracts between generators and suppliers/users.

New and Renewable Energy

The first Non Fossil Fuel Obligation (NFFO-1) Renewable Order for England and Wales made for 102 MW Declared Net Capacity (DNC).

Annex E

Energy and the environment

Carbon dioxide emissions

Introduction

E.1 The UK is committed under the United Nations Framework Convention on Climate Change (UNFCCC) and by agreement with the European Union to provide annual data on greenhouse gas emissions (GHG). This information is compiled by AEA Energy and Environment under contract to DECC and the Devolved Administrations. Data for the latest year (2007) were published by DECC on 3 February 2009. DECC provided provisional carbon dioxide emission estimates for 2008 based on provisional energy consumption data that were published in the March 2009 edition of the Energy Trends. These provisional estimates will be subject to revision when final estimates are published next year, but they provide an indication of the carbon dioxide and other greenhouse gas emissions in the most recent calendar year. The majority of provisional estimates are within 1 per cent of the final figures. Using the provisional carbon dioxide emissions data, DECC produced provisional total of GHG data for 2008 on 26 March 2009. Data presented in this chapter are consistent with the March 2009 carbon dioxide emissions data and thus are not consistent with energy data presented in this Digest.

E.2 This is the first edition of the Digest of UK Energy Statistics (DUKES) since the creation of DECC which brought together work on energy and climate change. As a result we are reviewing the presentation of data on emissions and to which extent these data still need to be presented in the energy publications. If you have any views or opinions on this matter, please contact Anwar Annut by telephone on 0300 068 5060 or via email at the address anwar.annut@decc.gsi.gov.uk

E.3 Emissions data are expressed in terms of millions of tonnes of carbon dioxide equivalent emitted per year (MtCO₂e/yr); this is in line with international emissions reporting. The figures can be converted to million tonnes of carbon by multiplying by the relative molecular weights (12/44). Carbon dioxide emissions in this report are shown as net emissions, which equates to total emissions minus total removals from the atmosphere by carbon sinks. Carbon sinks are within the Land Use, Land Use Change and Forestry (LULUCF) sector, which covers afforestation, reforestation, deforestation and forest management; no emissions in this sector come from energy related activity.

E.4 The key points to note are:

- Net CO₂ emissions in 2008 were provisionally 532 MtCO₂e/yr, or 10½ per cent below 1990 levels. This is 11 MtCO₂e/yr (2 per cent) lower than in 2007. Excluding the net contribution of LULUCF, emissions were provisionally 534 MtCO₂e/yr, or 9½ per cent below 1990 levels.
- The fall in emissions since 1990 occurred despite an overall increase of 4 per cent in gross inland energy consumption over the same period. The decrease in emissions between 2007 and 2008 resulted from fuel switching from coal to natural gas for electricity generation, combined with lower fossil fuel consumption by industry and in road transport.
- CO₂ emissions from use of coal and other solid fuels fell by 46 per cent between 1990 and 2008, largely driven by reduced coal fired electricity generation; emissions from oil were 14 per cent lower, whilst emissions from gas rose by 81 per cent.
- CO₂ emissions from power stations decreased by 16½ per cent between 1990 and 2008. Between 2007 and 2008 they fell by 3½ per cent. Emissions from power stations are driven by changes in both the fuel mix used for generation and generation efficiency; less coal but more gas and oil was used to generate electricity in 2008 compared with 2007.
- Over the period 1990 to 2008 there were also falls in emissions from the industrial, and the commercial and public service sectors; however emissions from households and the transport sector increased.
- These estimates do not include the effect of emissions trading. Installations covered by the EU Emissions Trading Scheme must buy allowances to cover emissions in excess of their allocations. In 2007, the latest year for which figures are available, the UK was a net acquirer of allowances¹. For reporting purposes, the UK emission estimates can be adjusted to take into account the net number of allowances acquired or sold during the year.

¹ The 2007 EU-ETS results are reported at www.defra.gov.uk/environment/climatechange/trading/eu/pdf/sectorlevel-ukresults-2007.pdf

- Emissions implied by the production of goods and services imported by the UK are not included, since under the UNFCCC agreement, these emissions are counted by the country in which they occur.

Why are CO₂ emissions important?

E.5 CO₂ emissions are important because, on a global basis, they contribute about 70 per cent of the potential global warming effect of anthropogenic emissions of greenhouse gases; in the UK CO₂ accounts for about 85 per cent of total greenhouse gas emissions. Carbon dioxide is naturally emitted by living organisms and absorbed by plants during photosynthesis. However, the burning of fossil fuels releases CO₂ fixed by plants many millions of years ago, and increases its concentration in the atmosphere. The UK contributes about 2 per cent to global man-made emissions of CO₂; within the UK energy production and consumption accounts for about 95 per cent of all CO₂ emissions.

Policy targets

E.6 The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) was agreed in December 1997. The then 15 EU member states (including the UK) committed to a collective target of reducing EU emissions of the basket of greenhouse gases, including CO₂, by 8 per cent relative to the base year level over the period 2008-2012. As part of an agreement between EU member states, the UK subsequently undertook to reduce its emissions by 12½ per cent as its contribution to the EU's target. The Kyoto Protocol became legally binding in February 2005 and to date has been ratified by 184 countries. In the UK, the base year relates to 1990 for emissions of carbon dioxide, methane and nitrous oxide, and 1995 for fluorinated compounds. In July 2007, on completion of a review of the UK greenhouse gas inventory, the UK's Kyoto base year figure was calculated to be 779.9MtCO₂e. This means that to meet the UK's Kyoto commitment, greenhouse gas emissions must be below 682.4MtCO₂e on average per year over the first five year commitment period of the Protocol (2008-2012). In accordance with this average yearly target, the Kyoto Protocol target for the UK was then set at 3,412MtCO₂e over the full five year period. This is known as the UK's assigned amount.

E.7 At the UN Climate Change Conference in Bali in December 2007², the Bali Action Plan was agreed. The Bali Action Plan establishes formal negotiations for developed and developing countries on a post-2012 framework, with a view to reaching agreement at Copenhagen in December 2009. Negotiations will cover a number of key areas including a long-term goal, action on mitigation by both developed and developing countries, deforestation, adaptation, technology and financial resources.

E.8 In December 2008, the European Parliament and Council reached agreement on the package, put forward by the European Commission in January 2008, to deliver on the EU's ambitious commitments to tackle climate change and promote renewable energy up to 2020 and beyond³. The EU is committed to reducing its overall greenhouse gas emissions to at least 20 per cent below 1990 levels by 2020, and to scale this up to as much as 30 per cent under a new global climate change agreement when other developed countries make comparable efforts. It has also set itself targets to increase the share of renewables in energy use to 20 per cent by 2020 and to save 20 per cent of EU energy consumption by 2020 through increased energy efficiency. Central to this is a strengthened and expanded Emissions Trading System (EU ETS). Emissions from the installations covered by the system – principally electricity generation, iron and steel production, mineral processing industries such as cement manufacture, and the pulp and paper processing industries - will be cut by 21 per cent by 2020 compared with levels in 2005. A single EU-wide cap on ETS emissions will be set, and free allocation of emission allowances (EUAs) will progressively be replaced by auctioning of allowances by 2020. Emissions from sectors not included in the EU ETS – such as transport, housing, agriculture and waste – will be cut by 10 per cent from 2005 levels by 2020. Responsibility for meeting this target has been redistributed between member states. The UK's target is to reduce emissions to 16 per cent below 2005 levels by 2020. The UK's share of the renewable energy target is to source 15 per cent of its energy from renewables by 2020.

E.9 Domestically, the 2007 Energy White Paper⁴ sets out the Government's energy strategy based on a commitment to independently regulated competitive energy markets. The UK Climate Change Act⁵ became law in November 2008. The Act has now set legally binding targets for the UK to reduce greenhouse gas emissions by at least 80 per cent by 2050, and carbon dioxide emissions by at least 26 per cent by 2020, both set against a 1990 baseline. The Act also requires the Government to set five year carbon budgets, which will cap net greenhouse gas emissions for five year periods, in order to set out the pathway for

² See www.unfccc.int/meetings/cop_13/items/4049.php

³ See www.ec.europa.eu/environment/climat/climate_action.htm

⁴ See www.decc.gov.uk/en/content/cms/publications/white_paper_07/white_paper_07.aspx

⁵ See www.defra.gov.uk/environment/climatechange/uk/legislation/index.htm

emissions reductions to 2050. The first three budgets, covering the periods 2008-12, 2013-17 and 2018-22, must be set by 1 June 2009.

Estimates of CO₂ emissions

E.10 The measurement of CO₂ emissions presented in this article is based on the international methodology agreed by the Intergovernmental Panel on Climate Change, under which the UNFCCC, and Kyoto Protocol commitments, and the UK's domestic targets for greenhouse gases are measured; this methodology excludes emissions from international aviation and shipping. This article generally refers to emissions including the net impact of emissions from land use, land use change and forestry (LULUCF). Selected annual figures since 1990 are shown in Table E.1. The 2008 provisional emissions estimates are based on provisional energy consumption data that were published in the March 09 edition of the Energy Trends.

Chart E.1: CO₂ emissions

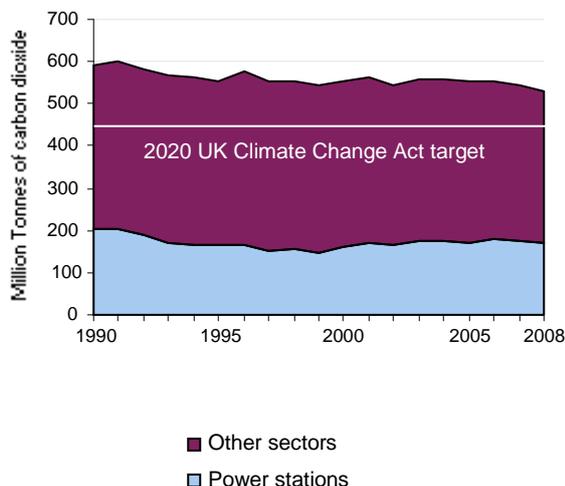
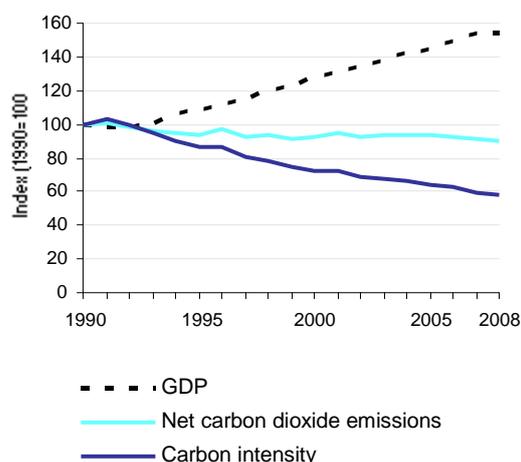


Chart E.2: Carbon intensity



Overall CO₂ emissions

E.11 Net CO₂ emissions fell provisionally by 10½ per cent between 1990 and 2008; over the same period CO₂ emissions excluding LULUCF fell by 9½ per cent. These falls in emissions occurred despite an overall increase of 4 per cent in energy consumption. A number of factors explain these contrary movements, such as changes in efficiency in generation of electricity and switching to less carbon intensive fuels such as gas. Chart E.1 shows UK CO₂ emissions together with the 2020 UK Climate Change Act target. The Kyoto commitment target is not shown because it relates to a basket of greenhouse gases, not just to CO₂.

CO₂ intensity

E.12 Chart E.2 shows the trends in Gross Domestic Product (GDP) and CO₂ emissions since 1990 to show the relationship between carbon dioxide emissions and the economy. Overall, GDP has increased by 54½ per cent while CO₂ emissions have fallen. The ratio of CO₂ emissions to GDP is also shown in Chart E.2. This ratio is known as the carbon intensity of the economy. The overall decline in carbon intensity of around 42 per cent has occurred because increased GDP has not resulted in overall increases in emissions of CO₂.

Chart E.3: CO₂ emissions by source

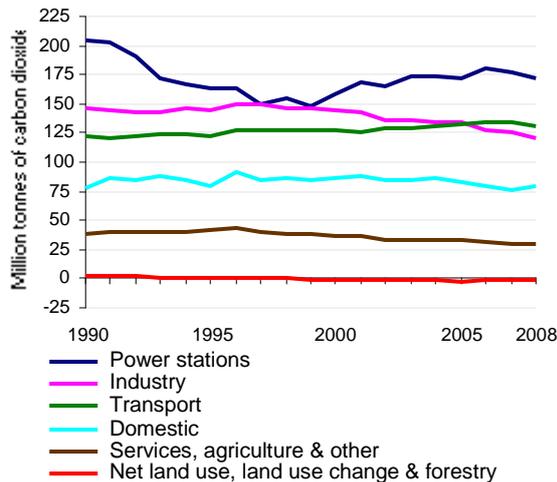
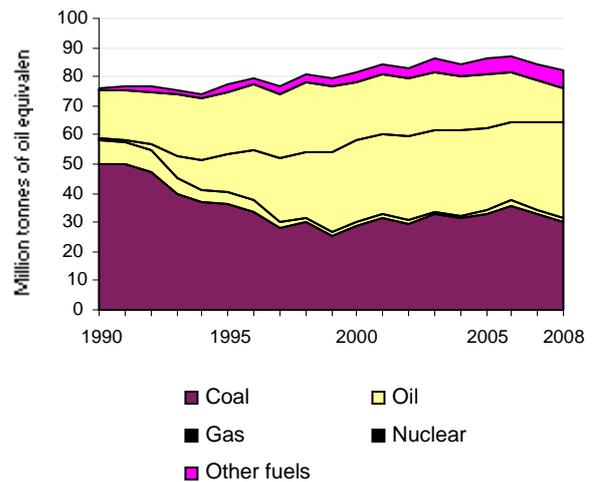


Chart E.4: Fuel used in electricity generation



CO₂ emissions by source

E.13 Chart E.3 shows the key sources of emissions, and how they have changed since 1990. It can be seen that emissions from the transport sector have shown a general increase throughout the period, and that since the late 1990s emissions from industrial use have fallen. The most substantial fall – in terms of reduced CO₂ emissions – occurred in the power stations sector, which fell by 16½ per cent (33 MtCO₂). The main sources are discussed in the following sections.

CO₂ emissions from electricity generation

E.14 CO₂ emissions from power stations currently account for just less than one-third of total CO₂ emissions. Consumption of electricity increased between 1990 and 2008 by 24 per cent but overall emissions from electricity generation have decreased by 16½ per cent. Emissions from electricity generation fell by 3½ per cent between 2007 and 2008 as a result of using less coal but more gas and oil during generation; the amount of electricity generated from nuclear sources fell. Chart E.4 illustrates the changing fuel mix in electricity generation between 1990 and 2008.

E.15 Chart E.5 shows the actual level of CO₂ emissions from electricity generation at power stations. It also shows what emissions would have been had improvements in technology and changes in generating fuel mix not been made. Since 1990 savings due to increased efficiency and fuel switching have led to a reduction in CO₂ emissions of 32½ per cent by 2008 compared with what they would have been (taking into account increased electricity demand). Around two-fifths of this saving was due to fuel switching between 1990 and 2008 (mainly an increased use of gas). Improved generation efficiency was responsible for the remaining savings.

E.16 The emissions from power stations can be reallocated to the sector consuming the electricity. The March 09 Energy Trends edition showed that around 32½ per cent of electricity was consumed by the domestic sector in 2008, implying that 55 MtCO₂ from the total of 171 MtCO₂ was attributable to that sector. Similarly 65 MtCO₂ can be allocated to the industrial sector, with 47 MtCO₂ to the commercial and public service sector, and 4 MtCO₂ to the transport sector. However the analysis shown in the paragraphs below do not reallocate the power station emissions.

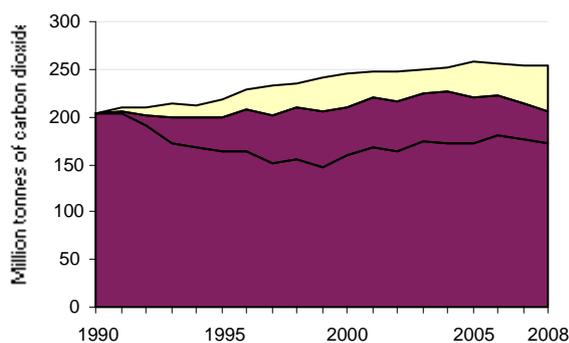
CO₂ emissions from the industrial sector

E.17 Industrial sector emissions – which account for 22½ per cent of the total - fell by 4½ per cent in 2008 compared with a year earlier, continuing the trend in reduced emissions from industry shown over the previous three years. Overall industrial emissions were 18 per cent lower than 1990 levels.

CO₂ emissions by transport

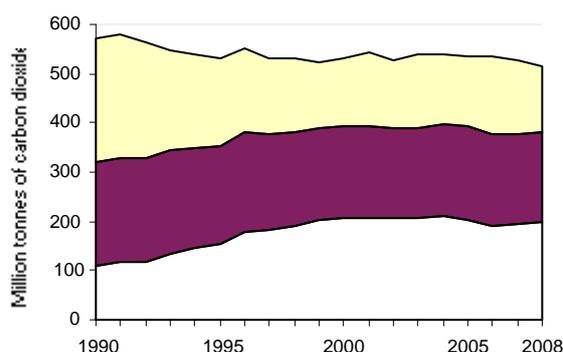
E.18 The transport sector accounted for one-quarter of CO₂ emissions in 2008, of which around 90 per cent was from road transport. Between 2007 and 2008, transport emissions fell by 2½ per cent, largely due to lower petrol consumption; however emissions from this sector are 7½ per cent higher than during 1990. Emissions from international aviation and shipping are excluded from the internationally agreed reporting framework; however the full UK inventory contains memo items for these emissions based on refuelling of other UK and non-UK operators from bunkers at UK airports and ports.

Chart E.5: CO₂ emissions from electricity generated at power stations



Improved efficiency in generation
 Saving due to change in fuel mix
 Actual emissions

Chart E.6: CO₂ emissions by fossil fuels



Gas
 Oil
 Coal

CO₂ emissions from the domestic (household) sector

E.19 CO₂ emissions from the domestic sector rose by 5 per cent between 2007 and 2008, resulting from increased use of all fossil fuels in this sector. The rise was due to an increased demand for space heating during the early and latter parts of 2008, compared with 2007, due to external temperatures being around 1 degree Celsius colder. Since 1990 emissions have increased by 2 per cent, despite non-electricity energy consumption in the domestic sector increasing by 9½ per cent over the same period. The change in consumption is a combination of an increase in the number of households – an increase of around 16 per cent - and reduced average energy consumption per household. The emissions estimates reported here for this sector exclude emissions from power stations as a result of domestic electricity consumption; domestic electricity consumption was 26 per cent higher in 2008 than during 1990.

CO₂ emissions by the commercial and public service sector

E.20 CO₂ emissions in these sectors fell by 17 per cent between 1990 and 2008; however there was a 1 per cent rise between 2007 and 2008 due to increased gas consumption.

CO₂ emissions from agricultural and forestry fuel use and land use, land use change and forestry

E.21 Emissions from fuel used in the agricultural and forestry sectors are estimated to have been some 19½ per cent (1 MtCO₂) lower than in 1990. Net land use, land use change and forestry emissions have changed from emitting 3 MtCO₂ in 1990 to removing 2 MtCO₂ in 2007; data are not yet available for 2008 so the 2007 estimate has been used for this component of these provisional estimates of total UK CO₂ emissions.

CO₂ emissions by fuel

E.22 Chart E.6 shows that an estimated 515 MtCO₂ were emitted in 2008 from the use of fossil fuels. CO₂ emissions from fossil fuels, including fuel used for generating electricity, decreased by 9½ per cent over the period 1990 to 2008. Over the same period, overall inland consumption of fossil fuels increased by 4½ per cent. The increased use of gas (from 26 per cent of fossil fuels used in 1990 to 45½ per cent in 2008) rather than coal and other solid fuels (whose share decreased from 34½ per cent to 18½ per cent) resulted in a decrease in emissions. Oil accounted for 39½ per cent of fossil fuels used in 1990 and 36 per cent in 2008.

E.23 The amount of CO₂ released by the consumption of one unit of energy depends on the type of fuel consumed. For example, more CO₂ emissions are emitted from one unit of coal than from one unit of gas. Emissions per unit of electricity supplied by major power producers from fossil fuels are estimated to have been 572 tonnes of carbon dioxide per GWh in 2008 overall; within this emissions from electricity generated from coal (880 tonnes of carbon dioxide per GWh electricity supplied) were around 2½ times higher than for electricity supplied by gas (357 tonnes of carbon dioxide per GWh). For all sources of electricity, (including nuclear, renewables and autogeneration) the average amount of carbon dioxide emitted amounted to 487 tonnes per GWh of electricity supplied.

Temperature correction

E.24 Temperature corrected figures show what emissions might have been if the average temperature during the year had been the same as the UK average for the years 1971 to 2000, which has been calculated at 9.7 degrees Celsius. Targets set at Kyoto are not temperature corrected. Average temperatures in 2008 (at 10.0 degrees Celsius) were 0.6 degrees Celsius lower than in 2007, but 0.3 degrees Celsius higher than the long-run average temperature. On a temperature corrected basis, total emissions of CO₂ for fuel combustion in 2008 were about 11½ per cent lower than in 1990.

Table E.1: CO₂ emissions by source

Million tonnes of carbon dioxide

	1990	1995	2000	2005	2006	2007	2008p
Power stations	204.5	164.2	158.7	172.6	181.2	177.3	171.3
Other energy industry	32.0	38.3	38.0	37.6	32.6	32.3	31.6
Other industrial	114.3	106.3	106.1	96.5	94.6	93.4	88.6
Domestic	78.6	79.8	85.6	83.1	79.8	76.1	80.0
Commercial and public services	25.1	26.3	25.4	22.6	21.3	20.7	20.8
Agriculture and forestry fuel use	5.1	5.3	4.7	4.5	4.3	4.1	4.1
Transport	122.6	122.2	126.7	131.9	133.6	134.9	131.6
Other sectors ¹	7.8	9.5	6.2	6.3	5.5	5.7	5.7
Total (excluding net LULUCF ²)	590.0	551.9	551.4	555.1	552.8	544.3	533.6
Net LULUCF ²	2.9	1.3	-0.3	-1.9	-1.8	-1.8	-1.8
Total (including net LULUCF ²)	592.9	553.1	551.1	553.2	551.1	542.6	531.8
Cumulative change since 1990		-6.7%	-7.1%	-6.7%	-7.1%	-8.5%	-10.3%

¹ Includes waste, fugitive emissions from fuels.

² Land Use, Land Use Change and Forestry

Table E.2: CO₂ emissions by fuel

Million tonnes of carbon dioxide

	1990	1995	2000	2005	2006	2007	2008p
Gas	110.1	152.9	207.2	202.6	191.0	194.1	199.0
Oil	209.5	199.0	184.5	189.5	186.9	184.8	180.1
Coal and other solid fuels	250.6	178.2	140.8	144.3	156.9	147.0	135.9
Non-fuel	22.8	23.1	18.6	16.7	16.2	16.7	16.7
Total	592.9	553.1	551.1	553.2	551.1	542.6	531.8

Other Greenhouse gases

E.25 Naturally-occurring greenhouse gases maintain the earth's surface at a temperature 33°C warmer than it would be in their absence. Water vapour is by far the most abundant greenhouse gas but there are also significant natural sources of carbon dioxide, methane, ozone and nitrous oxide. At present overall greenhouse gas concentrations in the atmosphere are increasing as a result of human activities. There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.

E.26 Targets for emission reductions cover a basket of six greenhouse gases: carbon dioxide, methane, nitrous oxide, hydro-fluorocarbons, per-fluorocarbons, and sulphur hexafluoride. 95 per cent of emissions from energy use come from fuel combustion. The most important of these is carbon dioxide. Carbon dioxide emissions contribute around 70 per cent of the potential global warming effect of anthropogenic emissions of greenhouse gases. Although this gas is naturally emitted by living organisms, these emissions are balanced by the uptake of carbon dioxide by the biosphere during photosynthesis; they therefore tend to have no net effect on atmospheric concentrations. The burning of fossil fuels, however, releases carbon dioxide fixed by the biosphere over many millions of years, and thus increases its concentration in the atmosphere.

Air pollution

E.27 Air pollution has a wide range of environmental impacts, with excessively high levels potentially affecting soil, water, wildlife, crops, forests and buildings as well as damaging human health. The main air pollutants associated with fossil fuel combustion are sulphur dioxide, fine particles (measured as PM₁₀), nitrogen oxides and carbon monoxide.

E.28 Sulphur dioxide is an acidic gas produced by the combustion of sulphur-containing fuels such as coal and oil. In 2007 there were 0.6 million tonnes of sulphur dioxide emitted, 84 per cent lower than 1990 and 90 per cent lower than in 1970. The decrease is a result of lower coal and fuel oil consumption over the period, and introduction of flue gas desulphurisation at coal fired power stations, operational from 1994. Sulphur dioxide emissions from road transport have decreased by 88 per cent since 1998 following a reduction in the sulphur content of fuel.

E.29 "PM₁₀" refers to fine, suspended particles in the air that come from a wide range of man-made and natural sources, including incomplete fuel combustion, wind-blown soil, and dust generated by activities such as quarrying. In 2007 there were 0.135 million tonnes of PM₁₀ emitted; a fall of 73 per cent since 1970 largely as a result of a 90 per cent fall in emissions from the residential sector.

E.30 A number of nitrogen compounds including nitrogen dioxide, nitric oxide and nitrogen oxides are formed in combustion processes when nitrogen in the air or the fuel combines with oxygen. These compounds can add to the natural acidity of rainfall. The total level of emissions in 2007 (at 1.49 million tonnes) was 46 per cent lower than in 1990, with substantial falls from both road transport and power stations, the two largest contributing sectors. Emissions from power stations declined during the 1990s due to increased output from nuclear stations, and combined cycle gas turbine stations replacing coal-fired plant, together with the effect of the installation of low NO_x burners at other coal fired power stations. A decline in output from nuclear power stations since 2000 has caused emission from the energy industry to rise, but they are still 45 per cent lower than in 1990. The fall in emissions from road transport is mainly due to tighter emissions standards for passenger and goods vehicles, including the introduction of catalytic converters on all new cars since 1993.

E.31 Carbon monoxide is derived from the incomplete combustion of fuel. In 2007, 2.1 million tonnes of carbon monoxide were emitted, a level 75 per cent lower than 1990 and 83 per cent lower than in 1970. Around two fifths of carbon monoxide emissions in the UK come from road transport, despite large reductions over the past thirty years due to tighter emission standards and the introduction of catalytic converters.

Oil pollution, oil spills and gas flaring

E.32 The amounts of oil spilled around the coasts of the United Kingdom and offshore (North Sea) are small in relation to total oil production, with the amounts discharged on drill cuttings, and with produced water generally much larger than from offshore installation spills. The total amount of oil spilled offshore during 2007 was 63 tonnes.

E.33 The number of oil spills recorded dropped from 392 in 1998 to 281 in 2007. Of those reported in 2007, 271 were for spills of less than 1 tonne.

E.34 The Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 (OPPC) came into effect in August 2005. Under OPPC installations a granted a permit for activities discharging oil-contaminated water to sea, but the oil content must not exceed 30 milligrams per litre. The average content of oil in produced water for 2007, for the UKCS as a whole, was 14.6 milligrams per litre compared to 19.9 milligrams per litre in the previous year.

E.35 Under the terms of petroleum production licences, gas may be flared only with the consent of the Secretary of State. Flaring at offshore installations in 2007 was estimated to be 3.54 million cubic metres of gas a day, 11 per cent lower than in 2006.

Data sources

E.36 Greenhouse gas emissions and air pollution statistics up to 2006 are published in the National Atmospheric Emissions Inventory which is compiled by the AEA Energy and Environment on behalf of Department for Environment, Food and Rural Affairs (Defra). Data and information on how the data have been compiled can be found:

- on the National Atmospheric Emissions Inventory web site at www.naei.org.uk;
- on the Defra web site, as part of the Digest of Environmental Statistics at www.defra.gov.uk/environment/statistics/index.htm;
- in the DECC *UK Energy Sector Indicators* publication at <http://www.decc.gov.uk/en/content/cms/statistics/publications/indicators/indicators.aspx>

E.37 Figures for the total number of oil spills reported are collected by the Advisory Committee on Protection of the Sea Annual Surveys of Oil Pollution around the Coasts of the United Kingdom.

E.38 Further information on oil spills and discharges is available on the DECC oil and gas website at www.og.decc.gov.uk/information/bb_updates/chapters/Table_chart3_1.htm
www.og.decc.gov.uk/information/bb_updates/chapters/Table3_2.htm

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Annex F

United Kingdom oil and gas resources

Introduction

F.1 This section provides background information on the United Kingdom's crude oil, natural gas liquid and natural gas production, disposal and operations. This information is intended as a supplement to that in the commodity balances included in Chapter 3. Most of the data (including those on gas) are obtained from the Department of Energy and Climate Change's Petroleum Production Reporting System. Further information can be obtained from DECC's oil and gas website at www.og.decc.gov.uk/

F.2 The annual statistics relate to calendar years, or the ends of calendar years, and the data cover the United Kingdom Continental Shelf [UKCS] (both onshore and offshore). Annual data for production, imports and exports of crude oil during the period 1970 to 2008 are given in Chapter 3, long term trends, Table 3.1.1 (www.decc.gov.uk/en/content/cms/statistics/source/oil/oil.aspx).

Oil and gas reserves

F.3 Information on oil and gas reserves can be found on DECC's oil and gas website at www.og.decc.gov.uk/information/info_strategy/index.htm

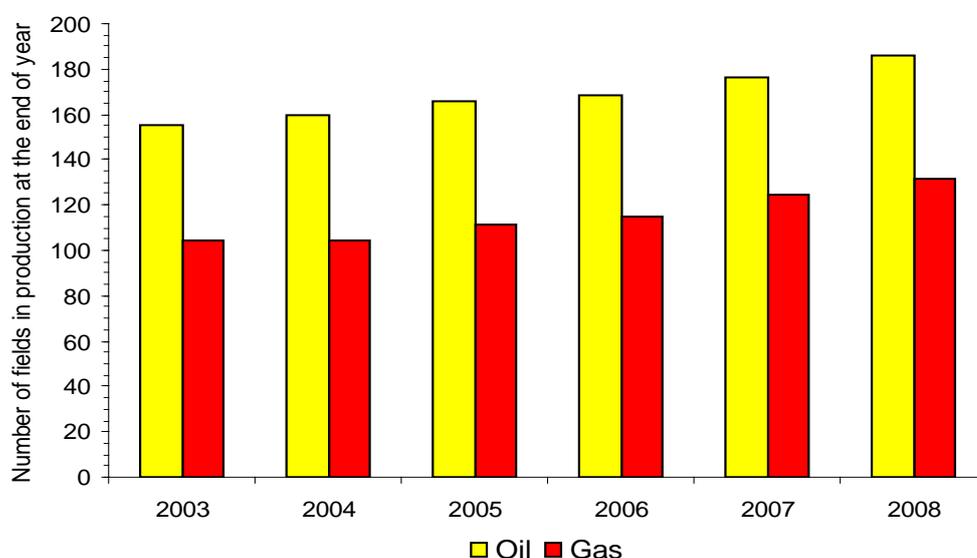
Offshore oil and gas fields and associated facilities

F.4 Table F.A below shows that the number of offshore oil fields in production and under development rose from 162 at the end of 2003 to 195 at the end of 2008. For offshore gas fields the equivalent increase has been from 111 to 135. Most oil fields also produce gas: these are not double-counted. The increases in fields in production are shown in Chart F.1 (offshore fields in production). Throughout the period since 2003 there have been 5 onshore oil terminals, 5 onshore associated gas terminals and 9 other (dry) gas terminals. While there are significant numbers of oil and gas fields onshore, total onshore production is less than 2 per cent of the UK total.

Table F.A: Offshore oil and gas fields and facilities

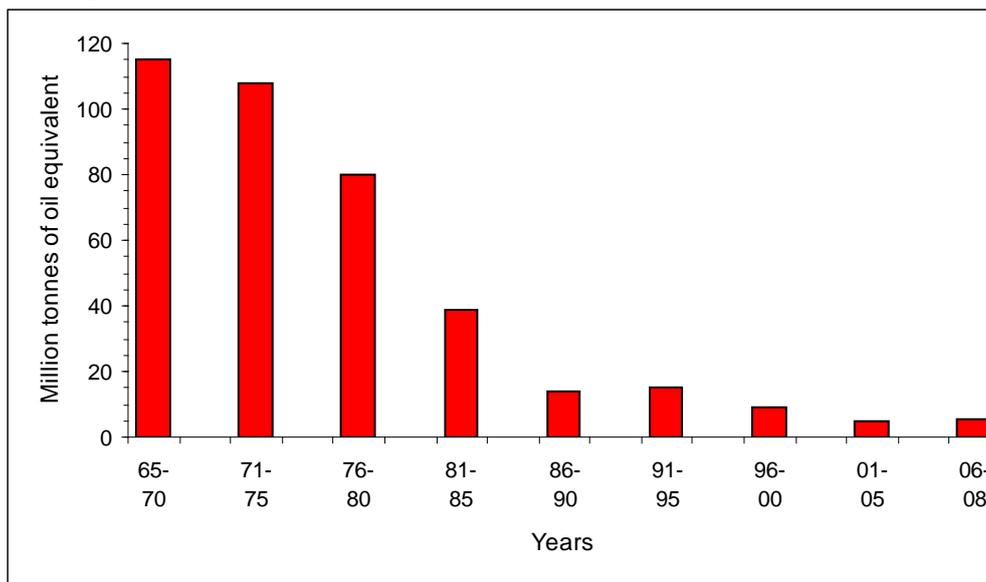
	2003	2004	2005	2006	2007	2008
Offshore oil fields in production	155	160	166	168	175	186
Offshore oil fields under development	7	15	13	16	13	9
Offshore gas fields in production	104	104	111	115	125	132
Offshore gas fields under development	7	8	6	8	4	3

Chart F.1: Offshore oil and gas fields in production, 2003 to 2008



F.5 The average size of fields commencing production in years 2006 and 2008 was 5.3 million tonnes of oil equivalent (see Chart F.2). This is slightly higher than the average for the period 2001–2005 because the large Buzzard field started production during 2007. The general fall in average field size reflects a decline in the size of fields discovered compared with the early period of the development of the North Sea and the effect of improved technology providing cost-effective means of extracting oil and gas from smaller fields and hitherto unpromising locations. The industry continues to face a range of challenges in order to realise fully the North Sea's potential. Government and industry are tackling these challenges via the joint Government and Industry task force, PILOT. For more information on PILOT see the website at www.pilottaskforce.co.uk/.

Chart F.2: Average size⁽¹⁾ of offshore oil and gas fields commencing production



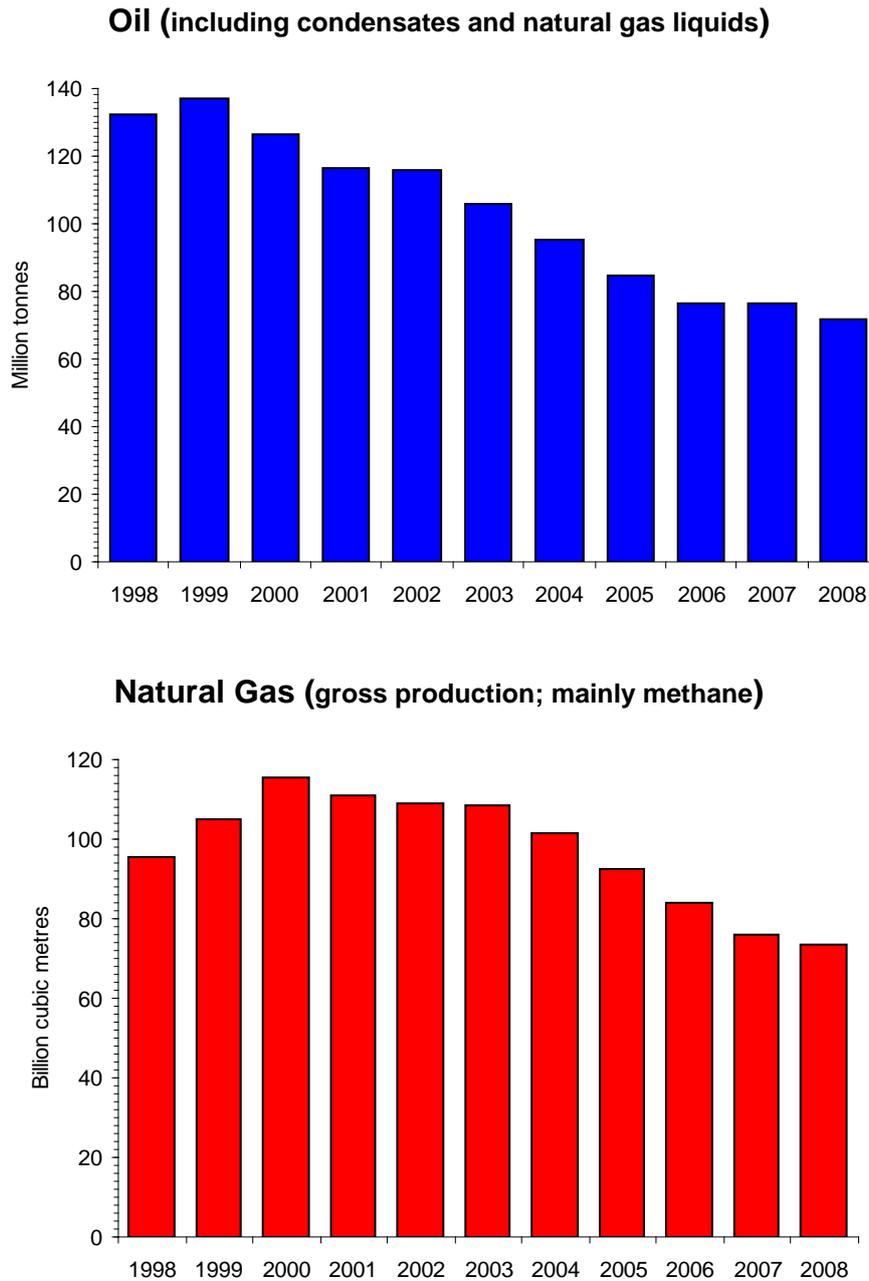
(1) Recoverable reserves originally present based on the operators' best estimate at the time production commenced.

Production of oil and gas (Table F.1, F.2 and F.3)

F.6 These tables show production of crude oil, natural gas (mainly methane) and natural gas liquids. Before 2001, oil and gas production were shown by field but are now based on terminal receipts rather than well-head production following the introduction in January 2001 of a simplified Petroleum Production Reporting System and subsequent in-house changes to the data collection system. These new data should be more accurate measures of production because the oil that leaves a terminal has been stabilised (that is any water, natural gas liquids or other organic compounds have been removed from the crude oil) and gross gas production includes gas used at terminals but excludes any flaring or venting at the terminals (not available before 2001). Except for associated gas fields, field level data can still be found at DECC's oil and gas website at: www.og.decc.gov.uk/information/index.htm

F.7 Chart F.3 shows the recent trend in total oil production from 1998 to 2008. After reaching a record level of 137 million tonnes in 1999, production has generally declined each year to 72 million tonnes in 2008, 48 per cent lower than the peak. Gross natural gas production (mainly methane) peaked in 2000 at 115 billion cubic metres but has declined to 73 billion cubic metres in 2008, 36 per cent lower than the peak.

Chart F.3: Production of oil and gas, 1998 to 2008



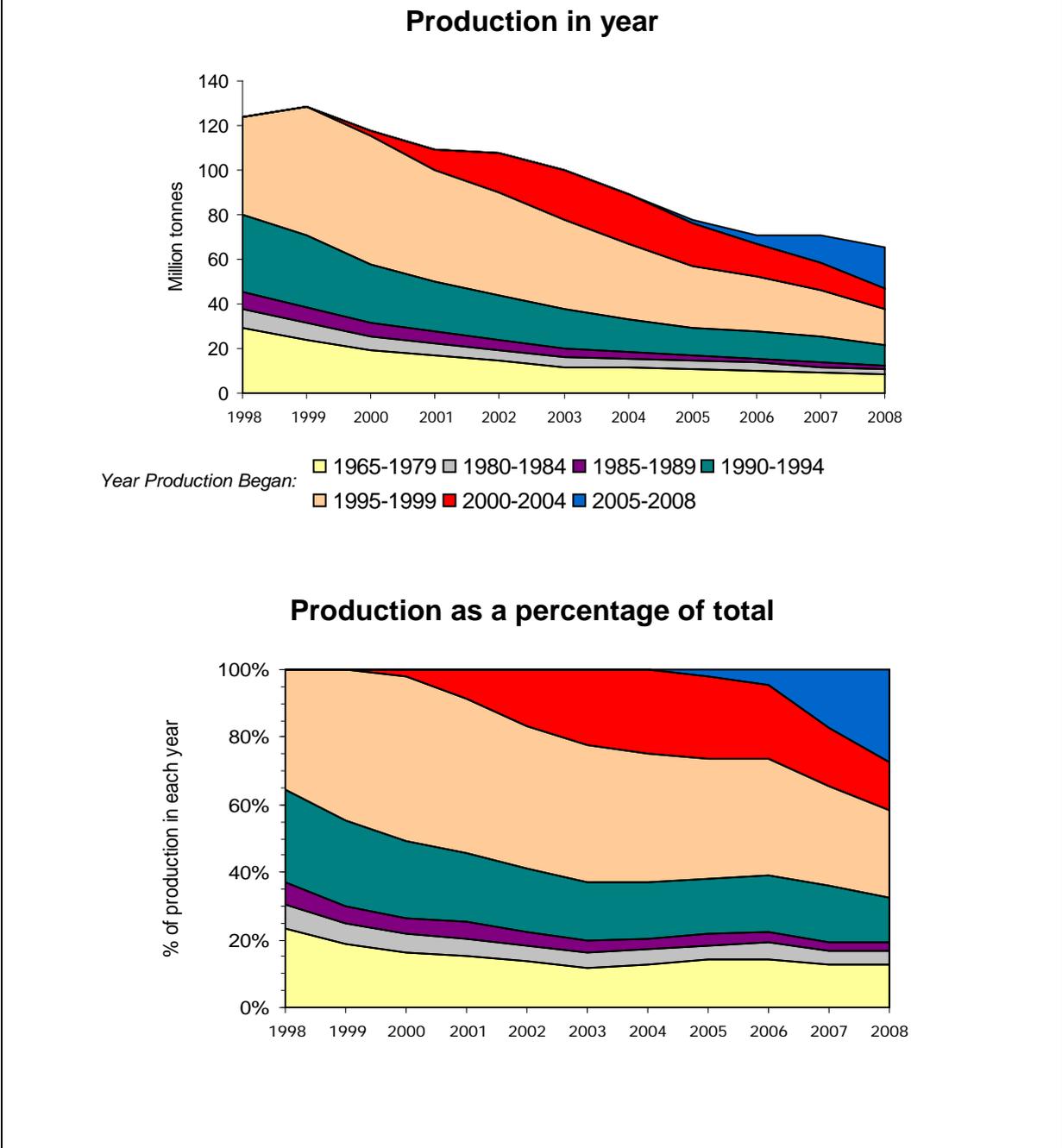
Production of crude oil

F.8 Production from established oil fields has been dropping in recent years. This is illustrated in Chart F.4 below, where oil production in each year from 1998 to 2008 is broken down by the age group of the fields in production during that year. Two charts are shown, the first with the actual amounts of crude oil produced during the year for each age group and the second with the same data transformed to show what percentage of total production each year comes from each field age group. The data used to produce these charts can be found on DECC's oil and gas website at www.og.decc.gov.uk/pprs/full_production.htm

F.9 It can be seen from the production chart that during the 1990s the amount of oil produced from older fields that first started production prior to 1990 was in decline. Indeed, it is noticeable how, even with those fields that started production in the period 1990 to 1994, a clear steady decline in production volumes is visible during the second half of the 1990s. This is due to the nature of more recent developments where, with the use of new technology, the crude oil can be extracted at a relatively greater rate than in the past, leading to a quicker exhaustion of the reserves in newer fields which are

also, on average, much smaller and have shorter producing lives. The contribution from newer fields, ie those that have come into production since the start of 1995, is also clearly a significant factor in the high level of production seen in the second half of the 1990s. In 2008, these newer (post 1994) fields accounted for 67 per cent of the UK's oil production. The charts also clearly reflect the start up of the very large Buzzard field at the beginning of 2007.

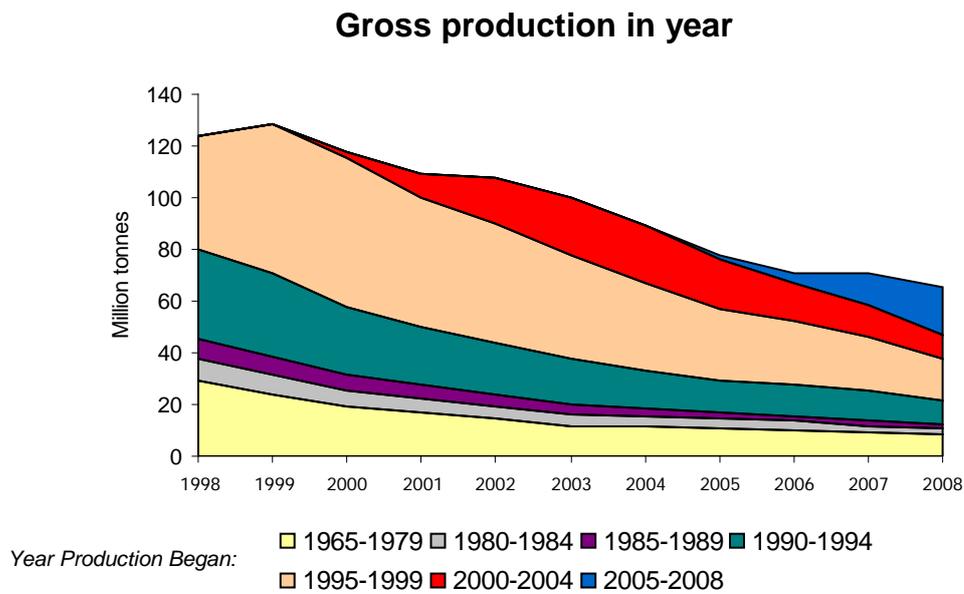
Chart F.4: Age profile of UK oil production



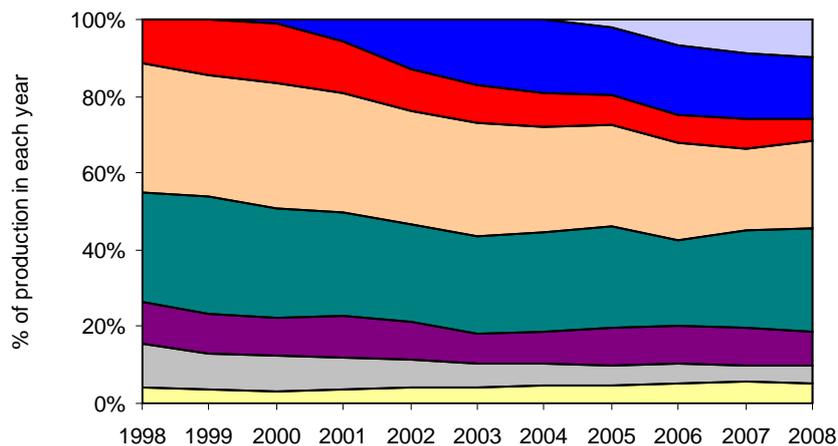
Production of gas

F.10 The charts below represent gross gas production reported at field/system level and include gas used for drilling, production and pumping operations, but excludes gas flared, vented and re-injected. The data used to produce these charts can be found on DECC's oil and gas website at www.og.decc.gov.uk/pprs/full_production.htm

Chart F.5: Age profile of gross UK gas production



Gross production as a percentage of total

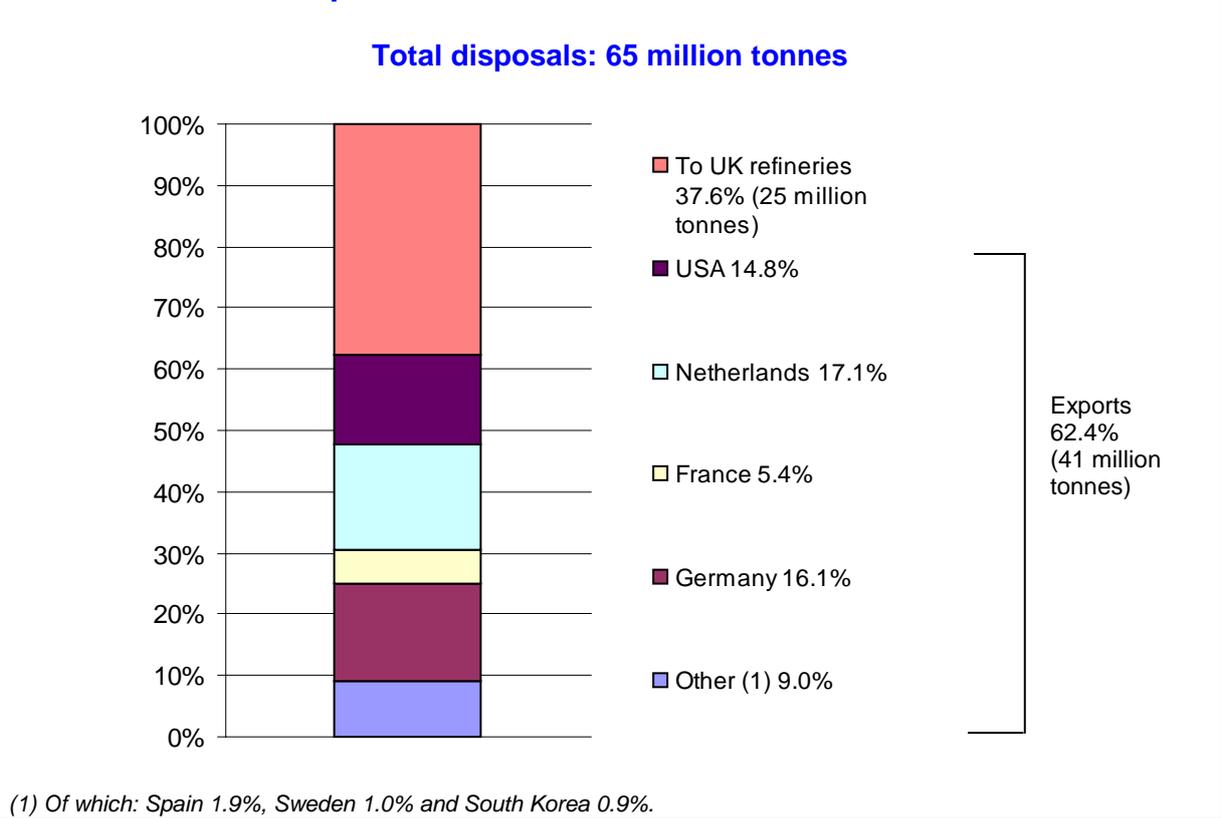


F.11 Chart F.5 shows that gross gas production reached a peak in 2000. Since then production has fallen by 36 per cent. As mentioned above (paragraph F.8) for older oil fields, production from the older gas fields that were discovered in the Southern North Sea has reduced in recent years as the reserves originally present in the fields become depleted. Chart F.5 illustrates this. The extent of the decline in gas production from older fields is not as significant as that shown for oil fields (Chart F.4). This is partly because most associated gas production is not back allocated to individual fields and, therefore, the associated gas is based on terminal start date rather than field start date.

Disposals of crude oil (Table F.4)

F.12 Table F.4 and Chart F.6 show the destination of crude oil split between amounts to UK refineries and exports (see technical notes, paragraphs F.16 to F.25) by country of destination (from which it may be transhipped elsewhere). The figures are obtained from returns made to the Department of Energy and Climate Change by operators of oil fields and onshore terminals under the Petroleum Production Reporting System (see paragraphs F.16 to F.18).

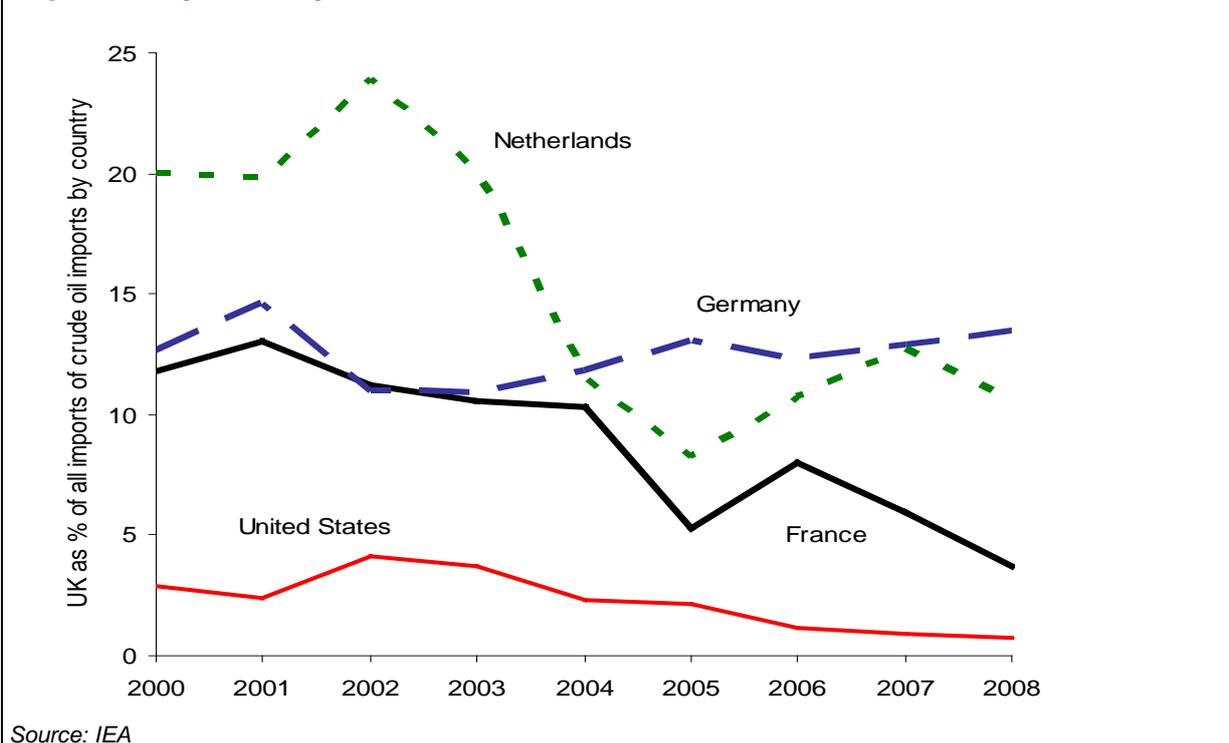
Chart F.6: UKCS disposals of crude oil 2008



F.13 The exports figures in Table F.4 may differ from those compiled by the United Kingdom Petroleum Industry Association (UKPIA) and published in Chapter 3. UKPIA figures also include re-exports. These are products that have been imported into the UK and stored before being exported from the UK, and were never part of UK production.

F.14 Exports of crude oil in 2008 were about 9.6 per cent lower than in 2007.

Chart F.7: UK exports of crude oil as a percentage of total crude oil imported by country 2000 to 2008



F.15 Chart F.7 shows the proportion of the total amount of crude oil imported by the USA, France, the Netherlands and Germany supplied by the UK. Whilst the USA represents a significant market for UK exports of crude oil, only $\frac{3}{4}$ per cent of total crude oil imports into the USA in 2008 were from the UK. The UK is a significant contributor to other European countries, as shown by the data for trade with France, Germany and the Netherlands given in the chart. However, much of the oil exported to the Netherlands is not actually consumed there, but is sold on to other countries via the Rotterdam spot market.

Technical notes and definitions

Petroleum Production Reporting System

F.16 Licensees operating on the UK Continental Shelf are required to make monthly returns on their production of hydrocarbons to the Department of Energy and Climate Change (DECC). DECC compiles this information in the Petroleum Production Reporting System (PPRS). The PPRS is used to report flows, stocks and uses of hydrocarbon from the well-head through to final disposals from a pipeline or terminal and is the major source of the information presented in this chapter.

F.17 Returns are collected covering field and terminal data compiled by relevant reporting units. Each type of return is provided by a single operator, but usually covers the production of a number of companies, since frequently operations carried out on the Continental Shelf involve several companies working together in joint ventures.

F.18 Every production system has one or more sets of certified meters to measure oil, gas or condensate production. The flows measured by the meters are used to check the consistency of returns and are therefore used to assure the accuracy of the PPRS.

Sales and expenditure by operators and other production licensees

F.19 Data are compiled from the Inquiry into Oil and Natural Gas (PQ1100) carried out by DECC. This inquiry collects information from all operators. The information collected covers all income and expenditure directly related to the production of oil and natural gas, including exploration, development and other capital expenditures together with operating costs and the value of sales.

F.20 These data can be found on DECC's oil and gas website at:
www.og.decc.gov.uk/information/bb_updates/appendices/Appendix7.htm

Exports

F.21 The term exports used in Table F.4 refers to figures recorded by producers of oil and gas for their exports. These figures may differ from the figures for exports compiled by HM Revenue and Customs (HMRC) and given in Annex G. In addition, HMRC now differentiate between EU and non-EU trade by using the term dispatches for trade going to other EU countries, with exports retained for trade going to non-EU countries. The differences can occur between results from the two sources of information because, whilst the trader's figures are a record of actual shipments in the period, for non-EU trade HMRC figures show the trade as declared by exporters on documents received during the period stated.

F.22 In addition, trade in oil frequently involves a "string" of transactions, which can result in the actual destination of the exports changing several times even after the goods have been dispatched. As such, differences can arise between the final country of destination of the exports as recorded by the producers themselves and in the HMRC figures. The HMRC figures also include re-exports. These are products that might originally have been imported into the UK and stored before being exported back out of the UK, as opposed to actually having been produced in the UK.

F.23 In editions of the Digest before 1997, these exports were called "shipments" in an attempt to highlight their difference from the other sources of trade data.

Units of measurement for gas

F.24 The basic unit of measurement for quantities of flows and stocks is volume in cubic metres at a temperature of 15 °C and a pressure of 1.01325 bar.

Monthly and Quarterly data

F.25 Monthly and quarterly data on the production of crude oil and natural gas from the UKCS, along with details of imports and exports of oil, oil products and gas are available. This information can be obtained free of charge by following the links given at the Energy Statistics section of the DECC web site at: www.decc.gov.uk/en/content/cms/statistics/source/source.aspx

[Annex F United Kingdom oil and gas resources main tables](#)

[Chapter 3 Petroleum main text](#)

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F.1 Crude oil and Natural Gas Liquids production

		Thousand tonnes												
CRUDE OIL		Total to end 1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total to end 2008
Offshore production:	Offshore loaded (1)	379,268	30,312	34,169	37,317	31,268	29,976	28,315	25,481	21,977r	18,875	18,679	16,007	671,644
Terminal receipts:	Flotta (2)	258,529	10,061	9,564	8,251	6,677	6,464	5,452	4,967	4,287	3,371	3,369	3,235	324,226
	Flotta West (3)	232	3,753	4,330	4,577	3,723	5,281	4,010	3,535	2,987	2,912	2,390	26	37,756
	Forties (4)	552,146	38,352	41,565	35,177	32,806	34,059	30,726	27,715	24,996	21,985	27,168	29,213	895,908
	Nigg Bay (5)	19,840	365	194	137	62	385	293	292	192	106	98	54	22,019
	Norpipe (6)	8,155	7,619	7,819	6,867	5,870	5,989	5,984	5,077	4,600	5,076	3,941	3,729	70,726
	Sullom Voe (7)	821,773	28,805	26,658	22,107	25,059	22,603	20,857	18,508	16,491	15,962	13,441	11,985	1,044,249
Total terminal receipts:		1,660,675	88,955	90,130	77,116	74,197	74,781	67,322	60,094	53,553	49,412	50,407	48,242	2,394,884
Onshore production:	Rail, road, terminals (8)	38,374	5,161	4,285	3,247	2,921	2,673	2,198	1,941	1,648	1,379	1,271	1,248	66,345
Other:	Extended well tests (9)	693	-	-	202	-	-	-	-	-	-	-	-	895
Total crude oil production:		2,079,010	124,428	128,584	117,882	108,386r	107,430	97,835	87,516	77,178	69,666	70,357	65,497	3,133,769
Total natural gas liquids production:		96,155	8,205	8,515	8,363	8,292	8,514	8,238	7,858	7,543	6,913	6,218r	6,168	180,982
Total crude oil and NGL production:		2,175,165	132,633	137,099	126,245	116,678	115,944	106,073	95,374	84,721	76,579	76,575r	71,665	3,314,751

(1) Production from: Alba, Angus, Banff, Beryl, Bittern, Blake, Boa (UK), Buckland, Captain, Chestnut, Clapham, Cook, Curlew, Curlew C, Donan (Maersk), Douglas, Douglas West, Fergus, Fife, Flora, Foinaven, Gadwall, Goosander, Gryphon, Guillemot A, NW and W, Harding, Kittiwake, Kyle, Leadon, Lennox, Maclure, Mallard, Ness, Nevis, Pict, Pierce, Ross, Saxon, Skene, Stafford (UK), Teal, Teal South, Tullich.

(2) Production from: Chanter, Claymore, Duart, Galley, Hamish, Highlander, Iona, Ivanhoe, MacCulloch, Petronella, Piper, Renee, Rob Roy, Rubie, Saltire, Scapa, Tartan, Tweedsmuir, Tweedsmuir South..

(3) Production from: Foinaven. Direct disposals from Foinaven are included in the offshore loaded figure.

(4) Production from: Andrew, Arbroath, Arkwright, Balmoral, Beaully, Beinn, Birch, Brae Area, Braemar, Brechin, Brenda, Brimmond, Britannia, Brodgar, Bruce, Buchan, Buzzard, Caledonia, Callanish, Cyrus, Drake, Egret, Elgin, Enock (UK), Erskine, Everest, Farragon, Fleming, Forties, Franklin, Glamis, Glenelg, Grouse, Hannay, Hawkins, Heron, Howe, Keith, Kingfisher, Larch, Lomond, Machar, Madoes, Maria, Marnock, Miller, Mirren, Monan, Montrose, Mungo, Nelson, Nicol, Rhum, Scoter, Scott, Seymour, Shearwater, Skua, Starling, Stirling, Sycamore, Telford, Thelma, Tiffany, Toni, Wood.

(5) Production from: Beatrice.

(6) Production from: Auk, Blane (UK), Clyde, Fulmar, Gannet A- G, Halley, Jade, James, Janice, Joanne, Judy, Leven, Medwin, Nethan, Orion.

(7) Production from: Alwyn North, Brent, Broom, Claire, Columba B/D, Columba E, Cormorant (North and South), Deveron, Don, Dunbar, Dunlin, Dunlin South West, Eider, Ellon, Forvie, Grant, Heather, Hudson, Jura, Kestrel, Loyal, Lyell, Magnus, Magnus South, Merlin, Murchison (UK), Ninian, Osprey, Otter, Pelican, Penguin, Playfair, Schiehallion, Strathspey, Tern, Thistle.

(8) Production from the Hamble and Holybourne terminals, plus other onshore oil fields.

(9) Extended well tests other than from established fields.

F.2 Gas production

Million cubic metres												
	Total to end 1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total to end 2008
Offshore dry gas:												
Terminal receipts and production from direct export fields:												
Bacton Perenco (1)	209,317	5,431	5,885	5,179	4,493	3,873	3,336	2,553	2,423	2,342	2,375	247,208
Bacton Tullow (2)	151,047	7,157	6,655	5,140	3,914	2,937	2,136	2,916	2,901	2,595	1,597	188,994
Bacton Shell (3)	265,816	7,966	9,638	10,660	7,466	7,932	8,193	8,230	6,174	4,347	5,706	342,129
Chiswick	-	-	-	-	-	-	-	-	-	-	542	542
Dimlington (4)	43,858	2,892	4,700	4,367	3,484	4,174	4,049	3,478	2,630	2,387	2,078	78,097
Easington (5)	62,876	2,486	2,412	1,216	2,249	2,158	2,018	1,799	1,644	1,529	1,681	82,068
Frigg (FUKA Pipeline) (6)	-	-	-	-	-	2,198	2,170	1,812	1,536	1,421	992	10,128
Grove (7)	-	-	-	-	-	-	-	-	-	238	184	422
Markham (7)	4,460	485	463	350	304	207	192	377	295	257	144	7,534
Minke (7)	-	-	-	-	-	-	-	-	-	138	24	162
Morecambe North (8)	9,804	1,144	4,487	3,775	3,922	3,363	2,865	1,972	1,668	1,195	1,211	35,406
Morecambe South (9)	67,936	9,971	8,436	8,224	7,480	7,853	8,181	5,906	2,410	3,692	4,222	134,310
Point Of Ayr (10)	4,769	1,870	2,228	2,539	2,279	2,617	1,882	1,552	1,310	1,130	819	22,995
Rough (11)	4,370	-	428	17	-	-	-	-	-	-	-	4,815
Theddlethorpe (12)	175,949	11,349	13,994	11,377	8,577	9,602	7,994	7,689	8,942	8,265	7,300	271,037
Windermere (7)	714	320	273	223	174	149	91	54	44	48	31	2,121
Offshore gas fields' own use (13)	14	-	-	1,026	897	861	912	872	788	684	724	6,777
Total offshore dry gas gross production:	1,000,928	51,071	59,599	54,092	45,239	47,924	44,019	39,210	32,765	30,269	29,629	1,434,744
Offshore associated gas:												
Terminal receipts:												
Bacton SEAL Shell (14)	1	-	93	2,207	7,026	7,391	8,464	7,567	7,101	6,833	7,041	53,724
Blane	-	-	-	-	-	-	-	-	-	14	38	51
CATS (15)	21,756	13,605	13,618	13,038	14,213	14,972	13,812	11,660	11,125	7,819	8,243	143,861
FLAGS (16)	108,821	9,700	10,307	11,651	10,578	7,890	7,720	8,482	7,755	6,659	5,934	195,496
Frigg (FUKA Pipeline) (6)	150,261	9,900	10,315	9,713	11,611	9,719	7,501	7,474	7,996	7,833	6,685	239,008
Miller (17)	13,631	1,109	624	256	233	100	174	144	51	3	-	16,325
Point Of Ayr (10)	-	-	-	-	-	77	440	730	766	935	1,022	3,969
SAGE (18)	40,302	15,459	16,802	15,350	15,138	15,704	14,827	13,075	11,998	11,570	11,034	181,260
Offshore oil fields' own use	45,807	3,937	3,763	4,730	4,781	4,565	4,513	4,277	4,170	3,961	3,759	88,262
Total offshore associated gas gross production:	380,579	53,710	55,522	56,945	63,581	60,418	57,451	53,409	50,962	45,626	43,756	921,958
Total offshore gross gas production:	1,381,507	104,781	115,121	111,036	108,819	108,342	101,470	92,619	83,727	75,895	73,385	2,356,701
Onshore production:												
Wytch Farm	1,402	149	111	115	108	82	73	61	46	34	44	2,224
Other terminals / fields	1,434	140	106	91	65	90	49	56	44	77	52	2,204
Total onshore gas gross production:	2,836	289	217	205	173	172	122	117	90	111	97	4,429
Total gross gas production:	1,384,343	105,070	115,338	111,242	108,992	108,514	101,592	92,735	83,817	76,006	73,482	2,361,130
Own use: (19)	72,819	6,344	7,033	6,770	6,854	6,607	6,627	6,320	5,978	5,567	5,280	136,198
Total net gas production:	1,311,524	98,726	108,305	104,472	102,138	101,907	94,965	86,415	77,839	70,439	68,202	2,224,931

(1) Production from: Baird, Beaufort, Bell, Bessemer, Boyle, Brown, Camelot (Central, South and North), Davy, Davy East, Garrow, Indefatigable, Indefatigable South West, Kilmar, Leman (BP), North Davy, Trent, Tyne (North and South).

(2) Production from: Arthur, Bure, Bure West, Dawn, Deben, Delilah, Excalibur, Galahad, Guinevere, Hewett, Horne, Lancelot, Malory, Mordred, Orwell, Thames, Thurne, Tristan, Waveney, Welland North West, Welland South, Wensum, Wren, Yare.

(3) Production from: Barque, Barque South, Brigantine (A, B, C and D), Carrack, Clipper, Corvette, Cutter, Galleon, Gawain, Indefatigable (Shell), Leman (Shell), Sean, Sean East, Skiff.

(4) Production from: Johnston, Mercury, Minerva, Neptune, Ravenspurn North, Ravenspurn South, Whittle, Wollaston.

(5) Production from: Amethyst East, Amethyst West, Helvellyn, Hoton, Hyde, Newsham, Rose, West Sole.

(6) Production from: Alwyn North, Bruce, Captain, Dunbar, Ellon, Frigg (uk), Forvie, Galley, Grant, Ivanhoe/Rob Roy, Keith, NUGGETS, Piper/Tartan, Renee/Rubie, Rhum, Ross.

(7) Gas exported to the Netherlands.

(8) Production from: Bains, Calder, Dalton, Millom, Morecambe North.

(9) Production from: Morecambe South.

(10) Production from: Hamilton, Hamilton East, Hamilton North, Lennox.

(11) Converted for use as an off-peak storage unit with effect from 1985.

(12) Production from: Alison, Alison KX, Anglia, Ann, Audrey, Bell (Conoco), Boulton, Caister (B and C), Callisto, Callisto North, Cavendish, Europa, Ganymede, Hawksley, Hunter, Ketch, Kelvin, McAdam, Mimas, Murdoch, Pickerill, Saturn (Annabel), Saturn (Atlas, etc), Saltfleetby, Schooner, Sinope, Valiant North, Valiant South, Valkyrie, Vampire, Vanguard, Victor, Viking, Viscount, Vixen, Vulcan, Watt.

(13) Prior to 2001, the own use figure is included within the terminal or field production figure.

(14) Production from: Elgin, Franklin, Glenelg, Halley, Scoter, Shearwater.

(15) Production from: Andrew, Banff, Drake, Egret, Erskine, Everest, Farragon, Fleming, Hawkins, Heron, Jade, James, Janice, Joanne, Judy, Lomond, Machar, Madoes, Marnock, Mirren, Monan, Mungo, Seymour, Skua.

(16) Production from: Bittern, Brent, Clapham, Clyde, Cook, Cormorant (North and South), Curlew, Fulmar, Gannet (A, B, C, D, E, F and G), Goldeneye, Guillemot A, Guillemot North West, Guillemot West, Howe, Kittiwake, Kyle, Leven, Magnus, Magnus South, Mallard, Medwin, Murchison (UK), Nelson, Orion, Pelican, Penguin, Pict, Staffjord (UK), Strathspey, Teal, Teal South, Thistle.

(17) Gas delivered direct to Boddam (Peterhead) power station by dedicated pipeline.

(18) Production from: Beinn, Beryl, Brae Area, Braemar, Britannia, Caledonia, Maclure, Ness, Nevis, Scott, Skene, Thelma, Tiffany, Toni, Tullich.

(19) Includes gas used at onshore gas terminals

F.3 Natural gas liquids net production

	Thousand tonnes									
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Offshore oil pipeline terminals (1):										
Ethane	534	567	485	511	528	495	402	356	362	333
Propane	852	682	903	969	954	849	773	678	627	672
Butane	705	483	857	960	961	866	778	722	659	684
Condensate	424	439	422	532	532	500	469	419	411	412
Total offshore oil terminals:	2,516	2,171	2,667	2,972	2,975	2,710	2,422	2,175	2,058	2,101
Offshore associated gas terminals (2):										
Ethane	1,173	1,321	1,114	1,085	1,003	978	1,011	925	791r	869
Propane	1,890	1,966	1,747	1,700	1,579	1,551	1,374	1,239	1,141r	1,254
Butane	1,203	1,229	1,044	1,059	997	975	856	810	744r	748
Condensate	950	1,025	1,033	1,086	1,050	1,062	1,380	1,311	1,057r	798
Total offshore associated gas terminals:	5,217	5,541	4,938	4,930	4,629	4,566	4,621	4,285	3,733r	3,670
Offshore dry gas terminals (3):										
Condensate	582	505	548	497	545	516	450	412	390	364
Total offshore dry gas terminals:	582	505	548	497	545	516	450	412	390	364
Onshore production (4):										
Ethane	-	-	-	-	-	-	-	-	-	1
Propane	104	76	68	59	45	40	34	29	28	25
Butane	96	70	61	52	41	23	15	11	10	7
Condensate	-	-	10	4	3	3	1	1	0	0
Total onshore production:	200	146	139	115	89	66	49	41	38	33
Total Ethane	1,707	1,888	1,599	1,596	1,531	1,473	1,414	1,281	1,153r	1,203
Total Propane	2,846	2,724	2,718	2,728	2,578	2,440	2,181	1,946	1,796r	1,952
Total Butane	2,004	1,782	1,962	2,071	1,999	1,864	1,648	1,543	1,412r	1,439
Total Condensate	1,956	1,969	2,013	2,119	2,130	2,081	2,300	2,143	1,858r	1,574
Total production:	8,515	8,363	8,292	8,514	8,238	7,858	7,543	6,913	6,218r	6,168

(1) Production from: Flotta, Forties, Nigg, Norpipe, Sullom Voe.

(2) Production from: Bacton SEAL Shell, CATS, FLAGS, Frigg (UK), SAGE.

(3) Production from: Bacton Perenco, Tullow, Shell, Dimlington, Easington, Barrow, Point Of Ayr, Theddlethorpe.

(4) Production from: Hamble, Holybourne, Knapton, Wytch Farm.

F.4 Disposals of crude oil⁽¹⁾

	Thousand tonnes										
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
UK refineries	46,887	47,170	38,335	32,770	32,060	29,960	27,692	27,971	24,484	25,878	24,574
Exports:	77,322	80,078	79,061	75,749	75,367	68,073	59,553	49,226	44,923	45,129	40,808
Albania	-	-	84	-	-	-	-	-	-	-	-
Bahamas (2)	257	143	65	-	-	-	-	67	88	-	84
Belgium	1,035	1,193	1,038	362	392	560	-	62	-	77	483
Canada	808	625	1,667	3,447	3,527	2,786	2,882	1,706	2,471	1,208	490
China	-	1,588	519	260	1,364	159	157	-	-	-	-
Denmark	-	-	-	79	64	57	-	-	104	-	240
Finland	788	929	690	1,674	184	245	236	552	790	1,626	250
France	15,261	15,177	11,975	11,725	10,019	9,842	8,528	4,685	7,249	5,154	3,501
Germany	17,406	11,879	10,732	11,043	8,058	8,854	9,521	11,000	10,251	10,271	10,542
Gibraltar	-	-	77	-	-	-	-	-	-	535	-
Greece	-	-	-	-	135	-	-	-	-	-	-
India	-	277	1,638	-	-	-	-	-	-	245	135
Italy	1,219	1,819	1,459	957	1,075	236	2,178	1,961	1,269	401	399
Lebanon	-	-	-	-	-	-	-	-	-	-	81
Lithuania	-	-	251	-	-	-	-	-	-	-	-
Martinique (2)	87	-	84	-	178	330	385	754	646	700	347
Morocco	-	-	163	-	-	-	-	-	-	-	-
Netherlands (3)	15,591	16,540	18,912	20,194	19,794	16,418	12,325	10,462	10,517	11,245	11,192
Norway	1,087	1,297	542	329	223	545	331	796	156	954	326
Poland	1,494	682	368	-	-	-	-	87	319	415	239
Portugal	1,157	1,394	714	413	1,078	1,054	563	250	606	85	-
Puerto Rico	-	-	-	-	-	212	103	-	60	-	-
Republic of Ireland	82	69	-	322	964	977	719	783	100	171	-
Singapore	-	-	-	-	-	-	-	-	38	117	83
South Africa	1,028	-	-	-	263	-	-	-	271	-	-
South Korea	-	260	-	-	-	480	85	-	-	81	605
Spain	3,403	4,040	2,107	2,025	1,062	589	808	575	389	612	1,211
Sweden	1,266	1,024	636	1,313	1,596	992	1,025	588	455	630	671
Turkey	-	-	-	-	-	-	-	-	-	471	277
USA	15,017	21,142	25,340	21,496	24,288	22,259	17,801	13,817	9,056	9,774	9,651
Virgin Islands	-	-	-	-	-	-	-	93	-	355	-
Unknown	-	-	-	110	1,103	1,478	1,906	988	88	-	-
Total disposals (4)	124,209	127,248	117,396	108,519	107,427	98,033	87,245	77,197	69,407	71,007	65,382

(1) Monthly data for aggregate disposals to refineries and exports are available - See paragraph F.25.

(2) Some of the exports to the Caribbean area may have been for transshipment to the USA.

(3) Exports to the Netherlands include oil for transshipment or in transit to other destinations (e.g. Belgium and Germany).

(4) Includes disposals of onshore production. The difference between disposals and production as shown in

Table F.2 is accounted for by platform and other field stock changes and by terminal and transit stock changes.

Annex G

Foreign trade

Introduction

G.1 This section brings together detailed figures on imports and exports of fuels and related materials, generally, in terms of both quantity and value. Table G.1 gives an overall view for all fuels, Tables G.3 to G.6 present more detailed figures for crude oil, petroleum products, gas, and coal and other solid fuels. Table G.2 presents a long term view of the value of imports and exports of fuels, from 1970 to 2008.

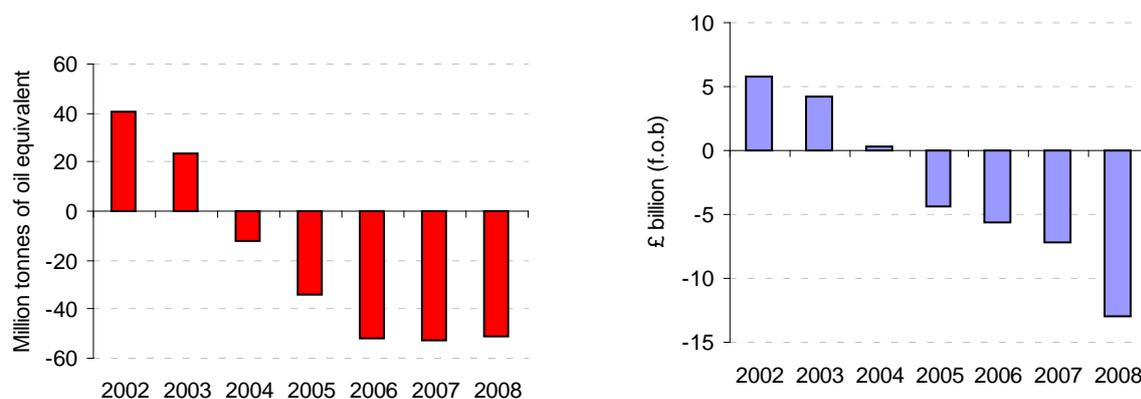
G.2 The information in this section is largely derived from returns made to HM Revenue and Customs (HMRC), and corresponds to that published in the *Overseas Trade Statistics of the United Kingdom* (O.T.S.). The figures for 2008 are provisional. Work continues to minimise differences between data reported by industry to HMRC (published in this annex) and that reported by industry to DECC (published in DUKES).

Imports and exports of fuel and related materials (Table G.1)

G.3 This table presents import, export and net export figures in quantity and value terms, broken down by the main fuel groups for the years 2001 to 2008.

G.4 To allow the values of imports and exports to be compared, additional series are included presenting import values on a "free on board" (f.o.b.) basis. Import values are normally recorded in "cost, insurance and freight" (c.i.f.) prices whereas f.o.b. prices are always used for export values. This approach is similar to that used by the Office for National Statistics in the overall trade figures when they compile the Balance of Payments. Fuller descriptions of the c.i.f. and f.o.b. methods of valuing imports and exports are given in paragraph G.29 of the Technical Notes.

Chart G.1: Net exports of fuel 2002 to 2008



Quantity

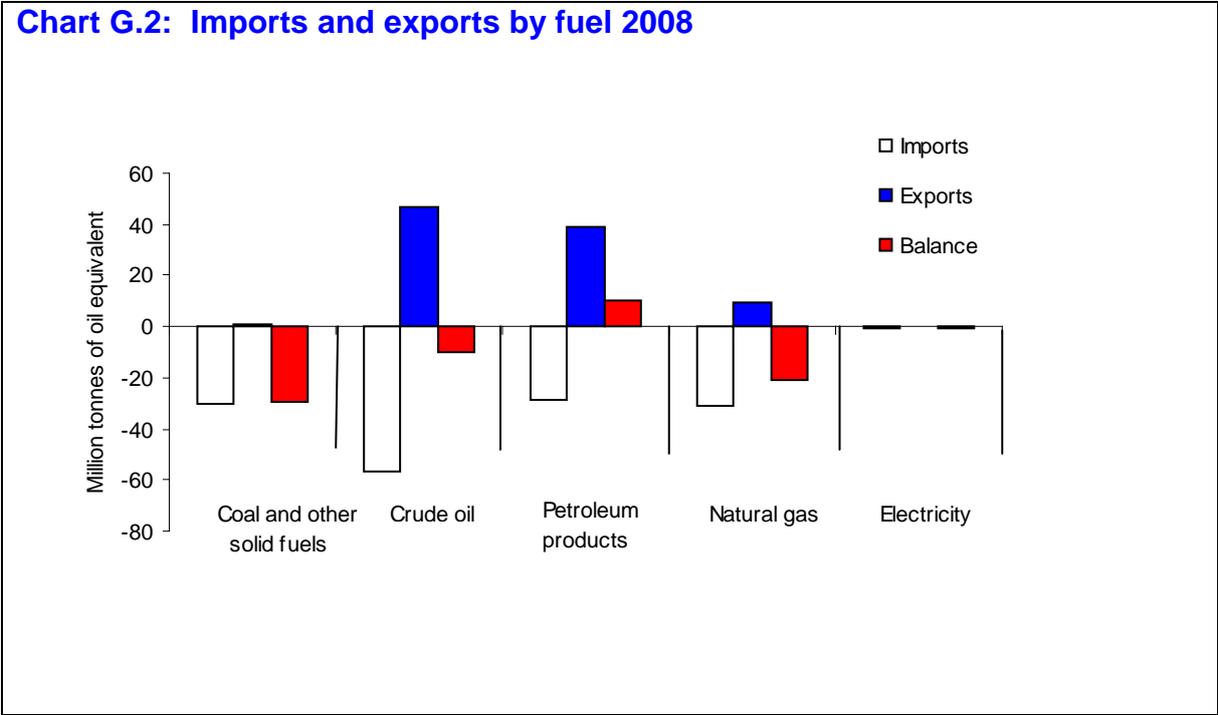
Value

G.5 Chart G.1 illustrates the recent trends in the trade balance in fuels, both in terms of value and quantity. Trends in the value of the trade balance since 1970 can be seen in Chart G.3, whilst figures are given in Table G.2.

G.6 In 2008 the United Kingdom remained a net importer of fuels, in financial terms, with a deficit, on a balance of payments (f.o.b.) basis, of £12.9 billion. This is compared to a £0.3 billion surplus in 2004.

The deficit of crude oil and petroleum products in 2008 was £5.6 billion compared to a £0.9 billion surplus in 2004.

G.7 In volume terms the United Kingdom became a net importer of fuels in 2004 with imports exceeding exports by 12.4 million tonnes of oil equivalent (mtoe). In 2008 net imports were at broadly similar levels to those of the last few years at 50.9 mtoe.



G.8 The figures for trade in individual fuels in 2008 are illustrated in Chart G.2. This shows the extent to which the United Kingdom’s trading position for all fuels is dominated by petroleum.

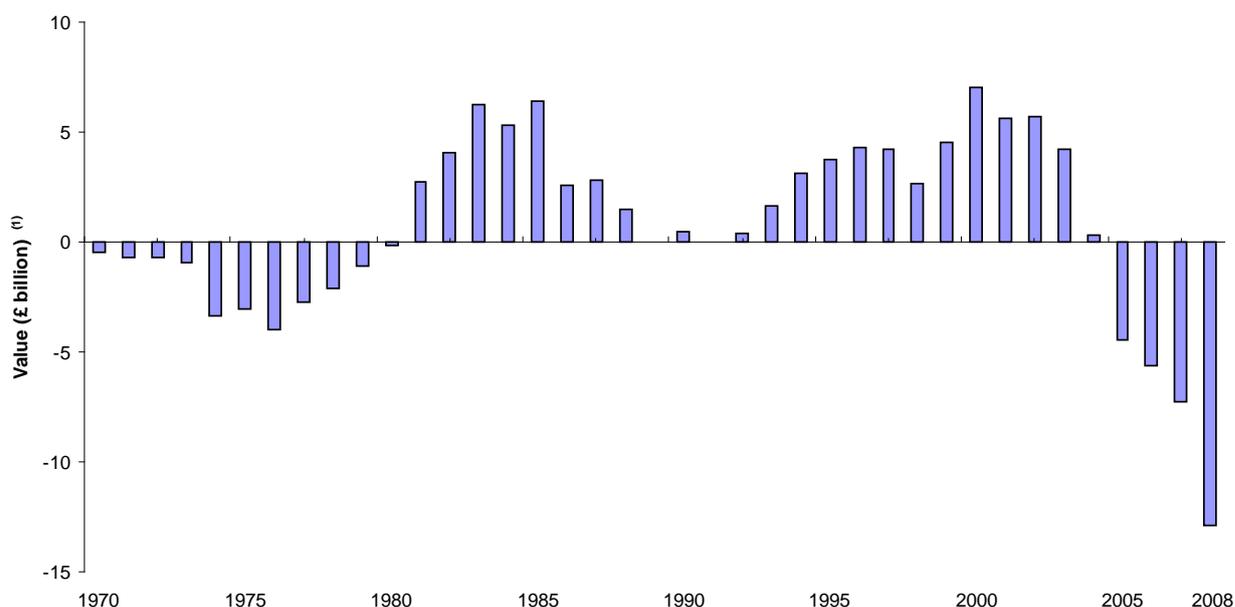
Value of imports and exports of fuels 1970 to 2008 (Table G.2)

G.9 Values of imports (c.i.f.) and exports (f.o.b.) broken down by the main fuel groups are given in Table G.2 which is based on Table G.1 with the series extended back to 1970. Import values on a f.o.b. basis are also included, enabling net exports to be presented on a comparable f.o.b. basis over the same period.

G.10 Although between 1989 and 1992 and again since 2004 the United Kingdom was a net importer of fuels in volume terms, there has tended to be a financial surplus in fuels, on a balance of payments (f.o.b.) basis until 2005. This is because the unit values of our exports have tended to be higher than that of our imports. However this trend changed from 2005 with the UK importing more gas, coinciding with a reduction in the trade balance for crude oil.

G.11 Chart G.3 below shows net exports of fuels since 1970. The United Kingdom’s trade in fuels was dominated by imports until exports started to grow substantially in the mid-1970s, when production from the North Sea started coming on line, achieving a trade surplus in 1981. This surplus was sustained between 1981 and 2004, except for a small deficit in 1989, and amounted to just under £80 billion over that period. However, these surpluses were reduced by the fall in oil prices in 1986, and then by the fall in North Sea production following the Piper Alpha accident in 1988 and the resulting safety work. Although the trade surplus increased steadily from 1992 to 1996, there were falls in 1997 and 1998 due to the fall in the price of crude oil. Prices of crude oil and petroleum products increased in 1999 and again in 2000 giving it, in current price terms, the highest net surplus. In 2001 the value of the trade surplus fell, reflecting falls in the price of crude oil and petroleum products; however, this was partly reversed by a 9 per cent increase in the net trade surplus during 2002. In the last four years the UK has been a net importer of fuel with deficits recorded both for oil and for the other fuels series. In 2008 the deficit for both series increased sharply, with the deficit for other fuels more than doubling as the UK imported much greater volumes of gas. The deficit on oil also increased reflecting the sharp

Chart G.3: Net exports of fuels⁽¹⁾ 1970 to 2008



(1) 'Free on board' basis and at current prices.

rise in prices; the price of crude oil jumped from an average of around \$70 per barrel in 2007 to nearly \$100 per barrel in 2008.

UK imports and exports of crude oil and petroleum products (Table G.3)

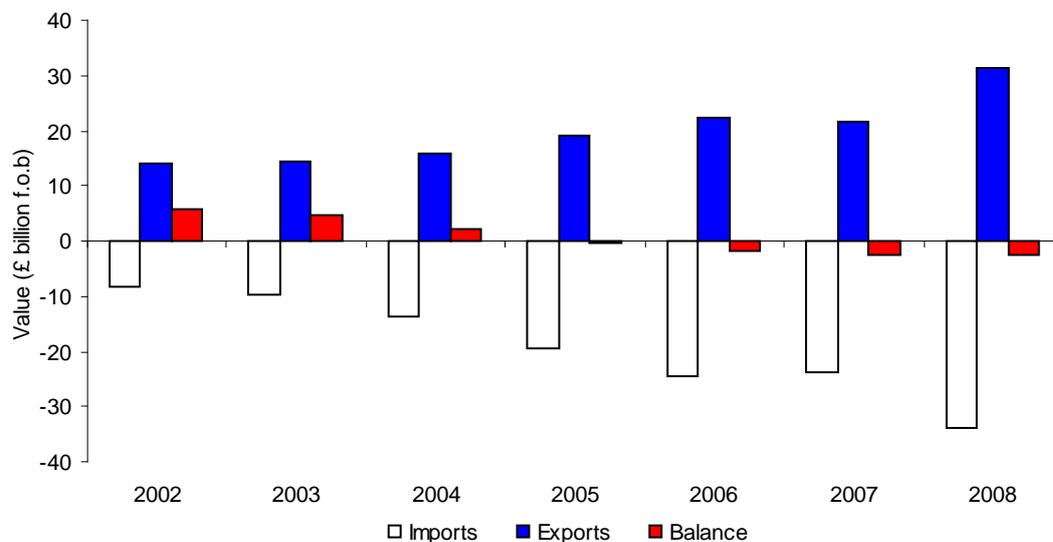
G.12 The data in this table outlines the pattern of trade in oil in the United Kingdom. Table G.3 shows quantities in thousands of tonnes, of crude oil and refined petroleum products, and unit values per tonne, with import values on a c.i.f. basis and export values on a f.o.b. basis. The total values of crude oil imports, on a f.o.b. basis, are shown in Table G.1.

G.13 The United Kingdom has generally been a net exporter of total oil and petroleum products since 1981. Broadly, the level of crude oil exports reflects North Sea production. Exports were reduced because the Piper Alpha accident reduced production from 1988 and then production levels remained lower until 1992, as higher levels of maintenance and safety work prolonged platform shutdowns. Chart G.4 shows the level of imports, exports and net exports in f.o.b. value terms from 2002 to 2008.

G.14 The main products imported into the United Kingdom in 2008 were aviation turbine fuel (kerosene), and gas & fuel oil. The main product exported in 2008 was fuel oil, which accounted for 26 per cent, followed by motor and aviation spirit which accounted for a further 21 per cent of the volume of exports.

G.15 Imports of petroleum products fell by 20 per cent between 2007 and 2008 from 31.5 to 25.3 million tonnes. Exports of petroleum products rose in 2008 to 35.8 million tonnes from 32.1 million tonnes in 2007. The largest contribution to this rise came from an increase of 30 per cent in exports of gas and diesel oil.

Chart G.4: Annual oil⁽¹⁾ trade 2002 to 2008



(1) Crude oil and petroleum products.

UK imports and exports of crude oil by country (Table G.4)

G.16 The data in Table G.4 show details of trade in crude oil by country. The import data are on a 'country of origin' (or production) basis as far as possible. Since the introduction of 'Intrastat' at the start of 1993, recording of country of origin for Intra-EU trade has been optional, so a small amount may be recorded as country of consignment i.e. the country from which the goods were consigned to the United Kingdom as opposed to the true country of origin. This change has had little impact, as virtually all of the UK's imported crude oil is supplied direct from countries outside the EU, in particular Norway.

G.17 Norway supplied 66 per cent of the United Kingdom's imports of crude oil in 2008, down from 71 per cent in 2007. The majority of the remaining imports came from Russia (12 per cent), Nigeria, Libya, and Algeria. The Middle East accounted for 0.6 per cent of imports, down from their 5 per cent share in 2000. In 2008, 73 per cent of the United Kingdom exports of crude oil went to EU countries, a rise from the 69 per cent seen in 2007. Most of the non-EU export trade was with the United States of America. The UK's two largest markets in the EU are Germany and the Netherlands; the bulk of the exports to Germany are for refining and consumption there, whilst the exports to the Netherlands include oil destined for onward trade to other countries.

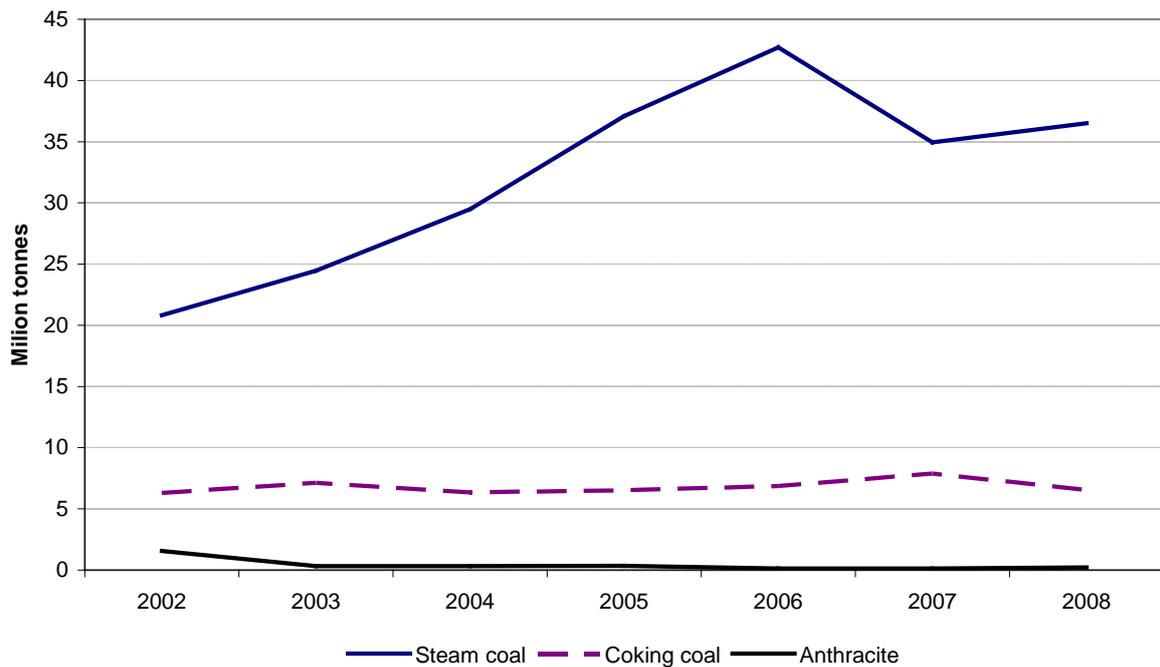
G.18 In most years, the average value per tonne of crude oil exported from the UK is higher than that for imported crude oil. However, in 2008 the import value per tonne recorded by HM Revenue and Customs was higher than the export figure.

Imports and exports of solid fuels (Table G.5)

G.19 Table G.5 gives a breakdown of imports and exports of steam coal, coking coal, anthracite and other solid fuels by country of origin or destination. The imports and exports data are provided by HM Revenue and Customs, but where there have been apparent misclassifications by the importers of the types of coal (eg because the country of origin does not produce that type of coal) DECC has made adjustments.

G.20 In 2008, the UK imported 44 million tonnes of coal and other solid fuels, a similar level to that imported in 2007. Fifteen per cent of coal imports were of coking coal in 2008, of which only limited amounts are produced in the United Kingdom. The figures for imports of coal by grade are illustrated in Chart G.5.

Chart G.5: Imports of coal by grade 2002 to 2008

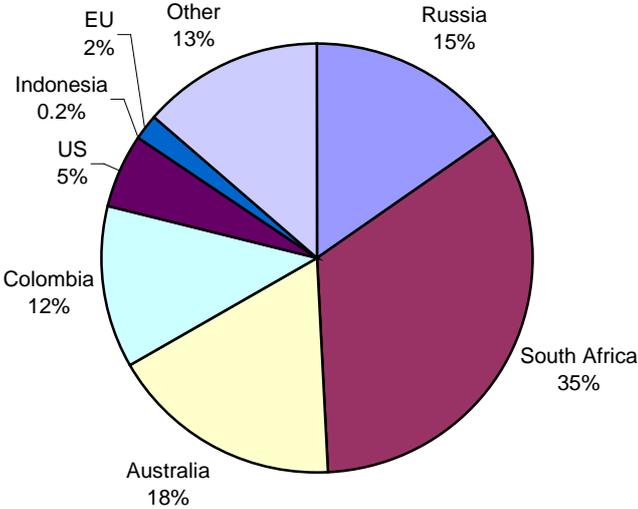


G.21 In 2008, 48 per cent of the United Kingdom's imports of coal came from Russia, with 10 per cent from South Africa. A further 31 per cent of coal imports came from three additional countries: Colombia, USA and Australia. Steam coal imports came mainly from Russia (57 per cent), Colombia (14 per cent) and South Africa (11 per cent). Imports of steam coal from Russia in 2008 were more than five times the volume imported in 2002. The majority of UK coking coal imports came from Australia (50 per cent), USA (23 per cent) and Canada (22 per cent). Imports of coal by country of origin are illustrated in Chart G.6.

G.22 Exports of coal and other solid fuel amounted to 1.3 million tonnes in 2008, up 0.6 million tonnes on 2007 volumes. Nearly a third of UK coal exports went to the Irish Republic.

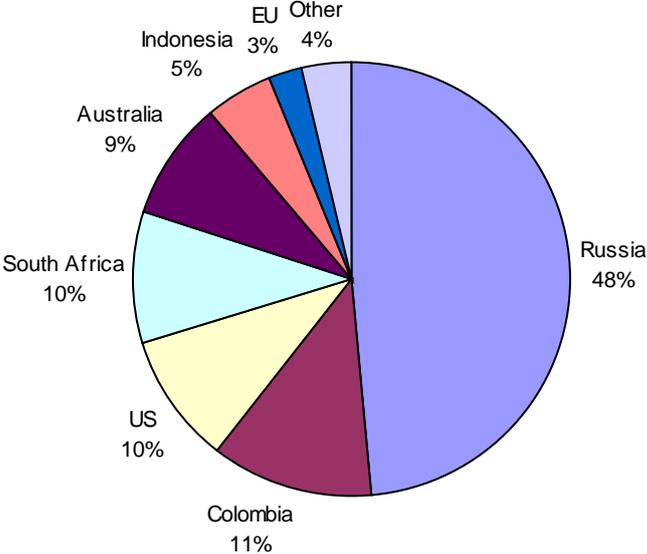
Chart G.6: Imports of coal by country of origin 2002 and 2008

2002



Total: 29.1 million tonnes

2008



Total: 44.0 million tonnes

Imports and exports of natural gas (Table G.6)

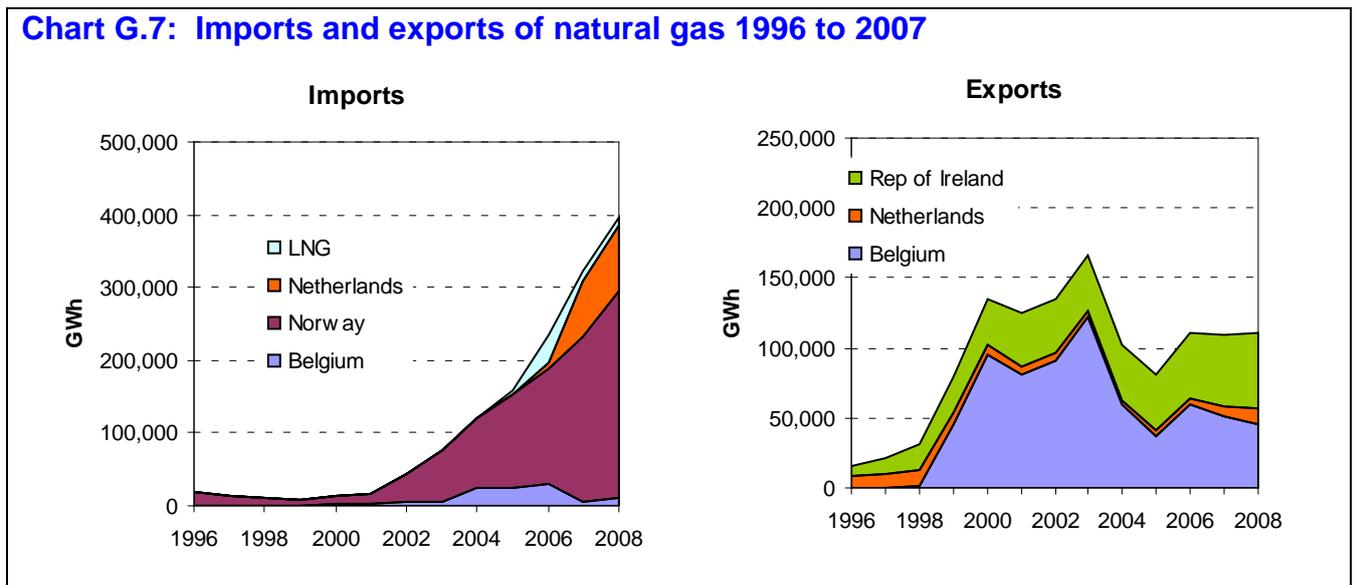
G.23 Table G.6 gives a breakdown of imports and exports of natural gas by country of origin or destination. The data are physical flows as reported by the pipeline or terminal operators to DECC. As such the data presented in this table differ from the nominated flows reported in Chapter 4 although the overall net flows (be they net imports or net exports) are essentially the same.

G.24 In 2008 the UK imported 395 thousand GWh of gas, up by over 20 per cent on 2007 levels. Over 70 per cent of the imports came directly from Norway. The second largest source of imports was the Bacton-Balgzand (Netherlands) interconnector which was commissioned at the end of 2006, which accounted for 23 per cent of imports. The other main source of imports was from Belgium via the Bactor Zeebrugge interconnector. The exact source country of these imports is not known due to the many transactions that occur so all flows from this route are assigned to Belgium. LNG shipments were down in 2008, arriving from four countries: Algeria, and Trinidad. Time series of imports and exports by country are shown in Chart G.7.

G.25 In 2008 the UK exported 111 thousand GWh of gas, broadly unchanged on 2006 and 2007 levels. The Republic of Ireland accounted for just under half of UK exports. A further 40 per cent of UK exports were transported to mainland Europe via the interconnector with Belgium. Again the eventual destinations of these shipments are not known, so UK statistics show the destination as Belgium. The other main destination of UK exports was the Netherlands, with exports taking place directly from the North Sea oil fields.

G.26 Between 1997 and 2003 the UK was a net exporter of gas. However, since 2000 UK gas production has declined. With UK consumption remaining broadly flat this has increased the demand for imported gas. In 2008 the UK was a net importer of 284 thousand GWh, a sharp reversal from the net export level of 120 thousand GWh recorded in 2000.

Chart G.7: Imports and exports of natural gas 1996 to 2007



Technical notes and definitions

G.27 The figures of imports and exports quoted are largely derived from notifications to HM Revenue and Customs, and may differ from those for actual arrivals and shipments, derived from alternative and/or additional sources, in the sections of the Digest dealing with individual fuels. Data in Table G.1 also include unpublished revisions to Customs data, which cannot be introduced into Tables G.3 to G.5.

G.28 All quantity figures in Table G.1 have been converted to million tonnes of oil equivalent to allow data to be compared and combined. This unit is a measure of the energy content of the individual fuels; it is also used in the Energy section of this Digest and is explained in Annex A, paragraphs A.45 to A.46. The quantities of imports and exports recorded in the Overseas Trade Statistics in their original units of measurement, are converted to tonnes of oil equivalent using weighted gross calorific values and standard conversion factors appropriate to each division of the Standard International Trade Classification (SITC). The electricity figures are expressed in terms of the energy content of the electricity traded.

G.29 Except as noted in Table G.1, values of imports are quoted "c.i.f." (cost, insurance and freight); briefly this value is the price that the goods would fetch at that time, on sale in the open market between buyer and seller independent of each other, with delivery to the buyer at the port of importation, the seller bearing freight, insurance, commission and all other costs, etc, incidental to the sale and delivery of the goods with the exception of any duty or tax chargeable in the United Kingdom. Values of exports are "f.o.b." (free on board), which is the cost of the goods to the purchaser abroad, including packing, inland and coastal transport in the United Kingdom, dock dues, loading charges and all other costs, charges and expenses accruing up to the point where the goods are deposited on board the exporting vessel or at the land boundary of Northern Ireland.

G.30 Figures of the value of net exports in Tables G.1 and G.2 are derived from exports and imports measured on a Balance of Payments (B.O.P) basis. The figures are consistent with the European System of Accounts 1995, the basis on which they are published by the Office for National Statistics. This means exports as recorded by HM Revenue and Customs, will differ from those recorded by the Office for National Statistics on a B.O.P basis. Table G.1 shows figures on both basis.

G.31 Figures correspond to the following items of S.I.T.C (Rev 3).

Coal	321.1 and 321.2
Other solid fuels	322.1 and 325 (part)
Crude oil	333
Petroleum products	334, 335, 342 and 344 (plus Orimulsion reclassified to division 278 during 1994)
Natural gas	343
Electricity	351

G.32 Figures for trade within the European Union given in Tables G.4 and G.5 cover trade between the other Member States belonging to the Union in 2008.

G.33 In 1993, the Single European Market was created. At that time, a new system for recording the trade in goods between member states, called INTRASTAT, was introduced. As part of this system only obliges small traders to report their annual trade and as some trading supply returns are late, it is necessary to include adjustments for unrecorded trade. This is particularly true of 1993, the first year of the system and of coal imports in that year.

Annex G Foreign Trade main tables

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G.1 Imports and exports of fuels ⁽¹⁾

Quantity	Million tonnes of oil equivalent							
	2001	2002	2003	2004	2005	2006	2007	2008(2)
Imports								
Coal and other solid fuel	24.8	20.0	22.5	25.4	30.6	34.6	30.0	30.1
Crude oil	43.2	44.6	48.7	61.4	59.1	60.8	48.3	57.0
Petroleum products	23.2	23.1	25.0	28.9	31.1	34.5	40.6	28.4
Natural gas	2.6	5.2	7.4	11.4	14.9	21.0	29.1	31.1
Electricity	0.9	0.8	0.4	0.8	1.0	0.9	0.7	1.0
Total imports	94.8	93.8	104.0	127.9	136.7	151.8	148.7	147.5
Exports								
Coal and other solid fuel	0.7	0.7	0.6	0.6	0.5	0.4	0.5	0.9
Crude oil	89.6	87.1	76.0	66.1	55.2	51.4r	50.1	47.1
Petroleum products	30.1	33.5	35.7	38.7	38.5	37.6	34.4	38.7
Natural gas	11.9	13.0	15.2	9.8	8.3	10.4	10.6	9.8
Electricity	0.0	0.1r	0.3r	0.2r	0.2	0.2	0.3	0.1
Total exports	132.3	134.3	127.7r	115.5r	102.7	100.0r	95.9	96.6
Net exports								
Coal and other solid fuel	-24.1	-19.3	-21.9	-24.8	-30.1	-34.2	-29.5	-29.1
Crude oil	46.4	42.5	27.3	4.8	-3.9	-9.5r	1.8	-9.9
Petroleum products	6.9	10.4	10.6	9.9	7.4	3.1	-6.2	10.3
Natural gas	9.3	7.8	7.8	-1.6	-6.6	-10.6	-18.5	-21.2
Electricity	-0.9	-0.7r	-0.2r	-0.6r	-0.7	-0.6	-0.4	-0.9
Total net exports	37.6	40.5	23.7r	-12.4r	-34.0	-51.9r	-52.8	-50.9
Value	£ million							
Imports - O.T.S basis (c.i.f.)								
Coal and other solid fuel	1,198	875	994	1,482	1,963	2,203	2,072	3,661
Crude oil	5,090	4,986	5,954	8,496	11,519	14,580	11,682	20,538
Petroleum products	3,693	3,244	3,876	5,194	7,852	9,788	12,205	13,256
Natural gas	187	260	135	670	1,731	2,512	2,883	6,426
Electricity	179	189	171	347	442	421	240	483
Total imports	10,347	9,554	11,131	16,189	23,507	29,504	29,082	44,364
Exports (f.o.b.)								
Coal and other solid fuel	61	62	53	60	65	49	65	156
Crude oil	10,486	9,802	9,240	9,338	10,733	12,760r	12,299	16,586
Petroleum products	4,236	4,302	5,162	6,564	8,305	9,627r	9,151r	14,727
Natural gas	746	848	946	645	737	1,315	996	1,945
Electricity	3	101	181	151	102	105	108	110
Total exports	15,531	15,115	15,581	16,759	19,942	23,855r	22,619r	33,525
Net exports - O.T.S basis								
Coal and other solid fuel	-1,136	-813	-941	-1,422	-1,898	-2,155	-2,007	-3,505
Crude oil	5,396	4,816	3,286	842	-786	-1,820r	616	-3,952
Petroleum products	543	1,058	1,285	1,370	453	-161r	-3,054r	1,472
Natural gas	559	588	811	-25	-995	-1,197	-1,887	-4,481
Electricity	-176	-89	10	-195	-340	-316	-131	-373
Total net exports	5,185	5,561	4,450	570	-3,566	-5,649r	-6,463r	-10,839
Imports - B.O.P. basis (f.o.b.) (4)								
Oil (3)	9,525	9,213	11,232	15,307	21,989	25,967r	26,787r	37,315
Other fuels	1,270	1,066	1,079	2,240	3,932	4,921	5,141r	10,440
Total imports	10,795	10,279	12,311	17,547	25,921	30,888r	31,928r	47,755
Net exports - B.O.P. basis (4)								
Oil (3)	5,290	5,108	3,376	893	-2,195	-2,794r	-4,031r	-5,649
Other fuels	301	613	871	-555	-2,230	-2,793r	-3,197r	-7,260
Total net exports	5,591	5,721	4,247	338	-4,425	-5,587r	-7,228r	-12,909

Source: Office for National Statistics; DECC

(1) See Energy Trends on the internet for the latest quarterly figures

(2) Provisional.

(3) Crude oil and petroleum products.

(4) The Balance of Payments figures are on a ESA95 basis.

G.2 Value of imports and exports of fuels, 1970 to 2008⁽¹⁾⁽²⁾

		£ million				
		1970	1971	1972	1973	1974
Imports (c.i.f.)	Coal and other solid fuels	2	46	57	27	66
	Crude oil	687	930	914	1,296	3,726
	Petroleum products (3)	242	259	257	389	823
	Natural gas	11	10	9	9	8
	Electricity	2	-	2	-	-
Total imports		944	1,245	1,239	1,721	4,623
Exports (f.o.b.)	Coal and other solid fuels	29	22	17	27	65
	Crude oil	8	10	21	23	29
	Petroleum products (4)	170	204	201	320	681
Total exports		207	236	239	370	775
Imports (f.o.b.)	Oil (5)	816	1,068	1,053	1,498	4,340
	Other fuels (6)	17	48	63	34	77
Total imports		833	1,116	1,116	1,532	4,417
Net exports⁽⁸⁾	Oil (5)	-503	-696	-660	-948	-3,372
(B.O.P basis)	Other fuels	+14	-24	-44	-4	-6
Total net exports		-489	-720	-704	-952	-3,378
		1975	1976	1977	1978	1979
Imports (c.i.f.)	Coal and other solid fuels	110	86	84	82	148
	Crude oil	3,371	4,445	3,971	3,506	3,678
	Petroleum products (3)	810	1,089	1,128	1,023	1,591
	Natural gas	14	21	44	188	356
	Electricity	1	-	-	-	-
Total imports		4,306	5,641	5,227	4,799	5,773
Exports (f.o.b.)	Coal and other solid fuels	84	72	80	90	100
	Crude oil	30	178	918	1,236	2,710
	Petroleum products (4)	705	1,004	1,086	1,038	1,500
Total exports		819	1,254	2,084	2,364	4,310
Imports (f.o.b.)	Oil (5)	4,043	5,407	5,051	4,504	5,242
	Other fuels (6)	122	121	154	291	517
Total imports		4,165	5,528	5,205	4,795	5,759
Net exports⁽⁸⁾	Oil (5)	-3,051	-3,922	-2,723	-1,930	-721
(B.O.P basis)	Other fuels	-29	-28	-41	-151	-351
Total net exports		-3,080	-3,950	-2,764	-2,081	-1,072
		1980	1981	1982	1983	1984
Imports (c.i.f.)	Coal and other solid fuels	228	171	218	264	651
	Crude oil	4,292	4,112	3,951	3,308	3,993
	Petroleum products (3)	1,856	2,173	2,413	2,506	4,360
	Natural gas	521	699	815	977	1,307
	Electricity	-	-	-	-	-
Total imports		6,897	7,155	7,397	7,055	10,311
Exports (f.o.b.)	Coal and other solid fuels	180	372	330	239	88
	Crude oil	4,220	7,096	8,542	10,111	12,173
	Petroleum products (4)	2,017	2,148	2,365	2,776	3,047
Total exports		6,417	9,616	11,237	13,126	15,308
Imports (f.o.b.)	Oil (5)	6,182	6,366	6,390	5,879	8,274
	Other fuels (6)	742	883	1,081	1,274	2,029
Total imports		6,924	7,249	7,471	7,153	10,303
Net exports⁽⁸⁾	Oil (5)	+280	+3,092	+4,607	+6,891	+6,860
(B.O.P basis)	Other fuels	-446	-375	-530	-672	-1,572
Total net exports		-166	+2,717	+4,077	+6,219	+5,288

G.2 Value of imports and exports of fuels, 1970 to 2008⁽¹⁾⁽²⁾ (continued)

		£ million				
		1985	1986	1987	1988	1989
Imports (c.i.f.)	Coal and other solid fuels	716	456	390	472	513
	Crude oil	4,341	2,440	2,703	2,044	3,079
	Petroleum products (3)	4,071	2,079	1,880	1,546	1,889
	Natural gas	1,511	1,320	878	692	615
	Electricity	-	80	242	268	305
Total imports		10,639	6,375	6,093	5,022	6,401
Exports (f.o.b.)	Coal and other solid fuels	178	190	109	96	109
	Crude oil	13,006	6,281	6,765	4,515	4,024
	Petroleum products (4)	3,611	2,200	1,893	1,646	2,039
Total exports		16,795	8,671	8,767	6,257	6,172
Imports (f.o.b.)	Oil (5)	8,385	4,547	4,751	3,645	5,102
	Other fuels	2,257	1,877	1,561	1,470	1,482
Total imports		10,642	6,424	6,312	5,115	6,584
Net exports⁽⁶⁾	Oil (5)	+8,030	+4,012	+4,045	+2,685	+1,222
(B.O.P basis)	Other fuels	-1,595	-1,413	-1,258	-1,228	-1,226
Total net exports		+6,435	+2,599	+2,787	+1,457	-4
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		1990	1991	1992	1993	1994
Imports (c.i.f.)	Coal and other solid fuels	630	734	744	731	598
	Crude oil	4,033	3,887	3,745	4,078	3,241
	Petroleum products (3)	2,427	2,063	1,711	1,766	1,689
	Natural gas	519	472	397	327	231
	Electricity	225	343	369	426	388
Total imports		7,834	7,499	6,966	7,328	6,148
Exports (f.o.b.)	Coal and other solid fuels	119	97	63	73	75
	Crude oil	5,172	4,370	4,413	5,147	6,095
	Petroleum products (4)	2,455	2,640	2,401	3,149	2,776
	Natural gas	-	-	2	28	45
	Electricity	25	-	-	-	-
Total		7,771	7,107	6,879	8,397	8,991
Imports (f.o.b.)	Oil (5)	6,443	6,010	5,562	6,012	5,142
	Other fuels	1,471	1,613	1,561	1,461	1,200
Total imports		7,914	7,623	7,123	7,473	6,342
Net exports⁽⁶⁾	Oil (5)	+1,631	+1,274	+1,610	+2,612	+3,937
(B.O.P basis)	Other fuels	-1,147	-1,260	1,254	-1,010	-787
Total net exports		+484	+14	+356	+1,602	+3,150
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		1995	1996	1997	1998	1999
Imports (c.i.f.)	Coal and other solid fuels	601	694	714	687	599
	Crude oil	3,236	4,035	3,647	2,170	2,273
	Petroleum products (3)	1,542	1,821	1,433	1,415	1,961
	Natural gas	105	117	103	43	27
	Electricity	408	391	406	374	396
Total imports		5,892	7,058	6,303	4,689	5,256
Exports (f.o.b.)	Coal and other solid fuels	70	82	82	69	61
	Crude oil	6,428	7,426	6,322	4,485	6,148
	Petroleum products (4)	2,621	3,268	3,239	2,328	2,849
	Natural gas	54	65	80	80	230
	Electricity	-	2	1	3	8
Total exports		9,174	10,843	9,724	6,965	9,297
Imports (f.o.b.)	Oil (5)	5,061	6,118	5,679	3,976	4,675
	Other fuels	1,100	1,166	1,145	916	753
Total imports		6,161	7,284	6,824	4,892	5,428
Net exports⁽⁶⁾	Oil (5)	4,323	4,810	4,560	3,042	4,448
(B.O.P basis)	Other fuels	-542	-516	-368	-421	53
Total net exports		3,781	4,294	4,192	2,621	4,501

G.2 Value of imports and exports of fuels, 1970 to 2008⁽¹⁾⁽²⁾ (continued)

		£ million				
		2000	2001	2002	2003	2004
Imports (c.i.f.)	Coal and other solid fuels	696	1,198	875	994	1,482
	Crude oil	5,095	5,090	4,986	5,954	8,496
	Petroleum products (3)	3,430	3,693	3,244	3,876	5,194
	Natural gas	135	187	260	135	670
	Electricity	373	179	189	171	347
Total imports		9,729	10,347	9,554	11,131	16,189
Exports (f.o.b.)	Coal and other solid fuels	74	61	62	53	60
	Crude oil	10,177	10,486	9,802	9,240	9,338
	Petroleum products (4)	4,867	4,236	4,302	5,162	6,564
	Natural gas	577	746	848	946	645
	Electricity	5	3	101	181	151
Total exports		15,699	15,531	15,115	15,581	16,759
Imports (f.o.b.)	Oil (5)	9,048	9,525	9,213	11,232	15,307
	Other fuels	968	1,270	1,066	1,079	2,240
Total imports		10,016	10,795	10,279	12,311	17,547
Net exports⁽⁸⁾	Oil (5)	6,536	5,290	5,108	3,376	893
(B.O.P basis)	Other fuels	505	301	613	871	-555
Total net exports		7,041	5,591	5,721	4,247	338

		2005	2006	2007	2008 (7)
Imports (c.i.f.)	Coal and other solid fuels	1,963	2,203	2,072	3,661
	Crude oil	11,519	14,580	11,682	20,538
	Petroleum products (3)	7,852	9,788	12,205	13,256
	Natural gas	1,731	2,512	2,883	6,426
	Electricity	442	421	240	483
Total imports		23,507	29,504	29,082	44,364
Exports (f.o.b.)	Coal and other solid fuels	65	49	65	156
	Crude oil	10,733	12,760r	12,299	16,586
	Petroleum products (4)	8,305	9,627r	9,151r	14,727
	Natural gas	737	1,315	996	1,945
	Electricity	102	105	108	110
Total exports		19,942	23,855r	22,619r	33,525
Imports (f.o.b.)	Oil (5)	21,989	25,967r	26,787r	37,315
	Other fuels	3,932	4,921	5,141r	10,440
Total imports		25,921	30,888r	31,928r	47,755
Net exports⁽⁸⁾	Oil (5)	-2,195	-2,794r	-4,031r	-5,649
(B.O.P basis)	Other fuels	-2,230	-2,793r	-3,197r	-7,260
Total net exports		-4,425	-5,587r	-7,228r	-12,909

Source: Office for National Statistics; DECC

(1) See Energy Trends on the internet for the latest quarterly figures

(2) See notes in Foreign Trade section of this and earlier editions of the Digest

(3) Includes petroleum products not used as fuel, eg lubricants, and liquefied petroleum gases other than natural gas.

(4) Includes petroleum products not used as fuel, eg lubricants, and liquefied petroleum gases, and small quantities of natural gas.

(5) Crude oil and petroleum products.

(6) Data prior to 1985 include small quantities of non-fuel products (eg peat). These items are excluded from the c.i.f. import data and the export data.

(7) Provisional.

(8) Net exports are the difference between exports and imports on a Balance of Payments (B.O.P) basis – see Table G.1 for figures in the period 2001 to 2008.

G.3 Imports and exports of crude oil and petroleum products

	2000		2001		2002		2003		2004	
	Quantity (Thousand tonnes)	Value per tonne (£)	Quantity (Thousand tonnes)	Value per tonne (£)	Quantity (Thousand tonnes)	Value per tonne (£)	Quantity (Thousand tonnes)	Value per tonne (£)	Quantity (Thousand tonnes)	Value per tonne (£)
Imports (c.i.f.)										
Crude oil	36,898	134.42	36,129r	128.12r	39,722r	121.92	43,805	133.90	55,898	151.45
Refined petroleum products (1)										
Petroleum gases (2)	1,119	131.81	1,156	119.68	709	140.93	549	250.19	818	203.89
Motor spirit and aviation spirit	1,971	209.98	3,440	200.42	2,280	168.78	1,828	178.08	2,215	227.44
Other light oils and spirit (3)	571	217.05	432	190.44	633	178.14	1,294r	179.05r	951r	200.33r
Aviation turbine fuel (kerosene)	5,761	192.95	6,716	174.37	7,156	156.05	6,073	173.09	7,687	215.84
Other kerosene	181	225.54	427	180.28	163	154.18	162	198.24	268	204.37
Gas oil/diesel oil	3,988	188.62	4,315	176.89	4,602	153.32	5,997	164.76	5,517	194.13
Fuel oil (4)	5,275	111.05	5,054	104.14	5,382	108.92	6,240	124.16	7,578	131.79
Lubricating oils	197	390.46	378	354.43	426	278.51	395	316.93	381	334.41
Petroleum coke	683	48.07	770	68.46	844	63.02	836	54.19	1,094	51.02
Other	44	454.58	67	341.76	39	484.88	79	287.34	77	316.00
Total refined petroleum products	19,790	167.03	22,756	160.72	22,235	144.92	23,455r	159.21r	26,587r	182.51r
Exports (f.o.b)										
Crude oil	70,924r	135.65r	82,269	128.05	79,951	123.00	69,031r	133.03r	61,386	154.01
Refined petroleum products (1)										
Petroleum gases (2)	5,398	149.40	3,713	170.40	4,759	140.43	4,645	164.95	3,814	216.14
Motor spirit and aviation spirit	4,625	194.45	4,335	167.47	4,467	165.62	4,057	190.95	6,600	218.44
Other light oils and spirit (3)	3,554	168.85	3,419	164.42	3,648	161.31	4,952	176.96	5,125	217.34
Aviation turbine fuel (kerosene)	521	184.11	440	172.62	634	153.60	590	172.97	983	221.42
Other kerosene	194	239.73	278	218.75	407	194.79	400	205.40	524	255.40
Gas oil/Diesel oil	6,936	162.56	5,699	147.10	7,718	134.17	7,345	153.14	6,995	186.83
Fuel oil (4)	6,205	108.51	6,238	94.46	7,039	95.31	7,859	109.63	10,623	103.71
Lubricating oils	337	299.39	824	300.27	705	276.12	880	265.23	788	272.37
Petroleum coke	502	233.29	504	228.45	588	188.48	482	198.20	520	188.93
Other	198	173.32	212	193.28	193	181.67	204	174.83	215	177.94
Total refined petroleum products	28,469	158.11	25,661	151.53	30,160	139.94	31,414	157.65	36,188	179.38

G.3 Imports and exports of crude oil and petroleum products (continued)

	2005		2006		2007		2008	
	Quantity (Thousand tonnes)	Value per tonne (£)	Quantity (Thousand tonnes)	Value per tonne (£)	Quantity (Thousand tonnes)	Value per tonne (£)	Quantity (Thousand tonnes)	Value per tonne (£)
Imports (c.i.f.)								
Crude oil	53,390	213.56	54,924r	261.72r	47,862r	266.93r	46,932	392.33
Refined petroleum products (1)								
Petroleum gases (2)	806	458.04	820	1,008.10	1,193r	461.45r	1,045	653.98
Motor spirit and aviation spirit	2,773	291.70	3,322	317.50	3,153r	380.83r	1,539	1,009.64
Other light oils and spirit (3)	1,091	263.59	1,331	311.83	1,117	307.64	56	380.05
Aviation turbine fuel (kerosene)	9,551	306.56	7,341	354.33	7,087r	342.09r	7,521	545.45
Other kerosene	97	324.32	322	336.16	625	354.30	615	537.61
Gas oil/diesel oil	5,688	290.46	8,520	321.37	8,725r	326.86r	8,470	495.94
Fuel oil (4)	6,950	167.53	8,468	196.80	8,151	208.55	4,278	323.76
Lubricating oils	426	408.21	501	542.47	590r	457.45r	481	696.56
Petroleum coke	973	53.90	880	70.54	486	92.68	884	112.86
Other	133	281.73	154	355.37	364	255.95r	371	327.91
Total refined petroleum products	28,490	263.46	31,660	309.52	31,492r	308.04r	25,260	508.06
Exports (f.o.b)								
Crude oil	52,634	213.88	49,320r	268.91r	46,758	269.32	45,691	385.07
Refined petroleum products (1)								
Petroleum gases (2)	3,729	245.50	2,499	299.59	2,423r	316.53r	3,695	372.50
Motor spirit and aviation spirit	7,250	273.07	7,060	329.86	7,676	316.60r	7,354	500.74
Other light oils and spirit (3)	5,811	251.16	5,102	325.03	4,953	343.21	4,392	451.58
Aviation turbine fuel (kerosene)	1,268	316.95	1,491	362.81	1,765	350.82	2,474	552.80
Other kerosene	481	338.87	381	395.50	369r	393.55r	281	520.49
Gas oil/Diesel oil	6,382	265.03	5,976	300.47	5,331r	300.73r	6,952	456.51
Fuel oil (4)	10,684	140.79	9,945	167.77	8,319	173.83r	9,363	270.68
Lubricating oils	750	357.80	858	420.69	570	517.05r	594	758.68
Petroleum coke	544	214.46	486	261.36	529	322.11	517	472.45
Other	287	188.82	240	202.63	148	268.17	197	276.06
Total refined petroleum products	37,188	230.05	34,037	276.99	32,082r	287.25r	35,818	419.14

Source: H.M. Revenue and Customs

(1) Excludes pitch, mineral tars and natural gas.

(2) Includes small quantities of unidentified non-petroleum gases.

(3) Includes wide-cut gasoline, white spirit and petroleum naphthas.

(4) Includes partly refined oil for further processing.

G.4 Imports and exports of crude oil by country

	2000			2001			2002			2003			2004		
	Quantity (Thousand tonnes)	Value (£million)	Value per tonne (£)	Quantity (Thousand tonnes)	Value (£million)	Value per tonne (£)	Quantity (Thousand tonnes)	Value (£million)	Value per tonne (£)	Quantity (Thousand tonnes)	Value (£million)	Value per tonne (£)	Quantity (Thousand tonnes)	Value (£million)	Value per tonne (£)
Imports (c.i.f.)															
Middle East															
Abu Dhabi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dubai	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iran	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kuwait	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oman	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saudi Arabia	1,573	220.0	139.90	623	72.3	116.05	324	41.7	128.68	762	89.7	117.73	1,363	190.7	139.91
Other countries	233	25.0	107.40	564	56.6	100.35	846	90.4	106.80	164	21.6	131.94	247	35.5	143.53
Total Middle East	1,806	245.0	135.71	1,187	128.9	108.59	1,170	132.1	112.85	926	111.3	120.24	1,611r	226.2	140.47
Algeria	1,992	319.8	160.56	1,335	182.7	136.82	2,025	276.6	136.61	1,308	188.9	144.41	1,477	249.9	169.20
Angola	-	-	-	468	65.3	139.40	127	16.4	129.05	-	-	-	-	-	-
Latvia	27	2.9	105.49	80	9.7	121.08	49	6.6	134.58	16	2.5	151.26	-	-	-
Libya	155	27.8	179.19	-	-	-	-	-	-	129	16.4	127.15	155	23.5	151.63
Lithuania	-	-	-	-	-	-	86	10.2	119.46	100	11.5	114.72	-	-	-
Mexico	782	95.2	121.63	821	85.4	104.05	820	84.7	103.39	749	79.9	106.76	323	32.0	99.08
Netherlands	-	-	-	11	1.1	98.3	36r	4.5r	124.76r	33	4.2	127.92	-	-	-
Nigeria	252	40.9	162.54	130	20.6	158.15	293	37.3	127.28	129	16.5	127.94	249	53.1	213.25
Norway	27,523	3,809.3	138.40	27,657	3,587.4	129.71	29,057	3,561.5	122.57	33,560	4,571.7	136.23	39,938	6,222.1	155.79
Russia	1,487	186.3	125.28	2,920	360.6	123.48	3,568	423.7	118.74	3,924	501.8	127.86	7,489	1,106.5	147.74
Venezuela	671	58.0	86.48	307	23.8	77.53	383	36.2	94.57	399	33.9	84.83	1,254	106.2	84.70
Other countries	2,204	174.8	79.31	1,224	163.5	133.57	1,691	199.0	117.69	2,532	327.1	129.16	3,402	446.3	131.17
Total Non Middle East	35,092	4,714.8	134.36	34,953	4,500.0	128.74	38,551r	4,710.7r	122.19r	42,880	5,754.3r	134.20	54,288	8,239.6	151.78
Total imports	36,898	4,959.9	134.42	36,140	4,628.9	128.08	39,722r	4,842.7r	121.92r	43,805	5,865.6r	133.90	55,898	8,465.9	151.45
Exports (f.o.b.)(1)															
European Union															
Belgium and Luxembourg	966	116.3	120.40	383	51.1	133.41	434	53.0	122.27	478	69.1	144.66	126	17.8	140.97
Denmark	-	-	-	70	9.9	140.00	64	8.0	124.00	57	7.2	128.00	-	-	-
Finland	816	105.0	128.76	1,058	139.2	131.58	343	44.7	130.60	328	41.8	127.49	240	41.9	174.68
France	10,330	1,376.4	133.24	12,637	1,640.6	129.82	11,018	1,353.0	122.80	11,139	1,501.8	134.83	9,454	1,461.2	154.56
Germany	11,531	1,560.9	135.37	14,550	1,892.8	130.09	9,468	1,172.4	123.82	9,354	1,250.2	133.65	11,472	1,807.7	157.57
Greece	-	-	-	-	-	-	134	15.6	116.15	-	-	-	-	-	-
Irish Republic	-	-	-	163	21.1	129.64	943	116.9	123.98	785	102.7	130.86	641	98.6	153.77
Italy	471	53.1	112.83	683	83.7	122.45	962	118.0	122.65	-	-	-	281	52.6	187.00
Netherlands	13,771	1,908.4	138.58	22,314	2,858.9	128.12	22,046	2,664.7	120.87	17,583	2,367.9	134.67	13,939	2,172.9	155.89
Portugal	694	87.2	125.61	757	98.2	129.74	998	122.3	122.55	1,071	136.7	127.63	574	86.1	150.09
Spain	2,090	277.9	132.94	2,037	262.6	128.95	911	104.3	114.54	837	115.9	138.47	177	24.9	140.87
Sweden	315	40.4	128.09	1,526	190.5	124.85	2,457	300.6	122.33	1,812	246.1	135.83	2,159	338.7	156.85
Poland(2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total EU	40,984	5,525.6	134.82	56,177	7,248.4	129.03	49,777	6,073.5	122.01	43,443	5,839.7	134.42	39,064	6,102.5	156.22
Canada	1,577	199.3	126.44	3,816	452.3	118.55	4,950	594.9	120.17	3,136	397.9	126.87	2,405	340.5	141.57
Norway	85	7.9	92.58	385	53.0	137.64	77	9.7	127.12	287	37.8	131.69	648	94.4	145.76
U.S.A.	26,365	3,591.8	136.23	21,587	2,740.8	126.96	23,514	2,977.3	126.61	21,049	2,775.1	131.84	18,508	2,815.3	152.11
Total Non EU	2,604	383.1	147.15	303	39.6	130.61	1,632	178.3	109.28	1,114r	132.7r	119.07r	760	101.4	133.46
Total exports	71,615	9,707.8	135.56	82,269	10,534.1	128.05	79,951	9,833.7	123.00	69,031r	9,183.2r	133.03r	61,386	9,454.1	154.01

G.4 Imports and exports of crude oil by country (continued)

	2005			2006			2007			2008		
	Quantity (Thousand tonnes)	Value (£million)	Value per tonne (£)	Quantity (Thousand tonnes)	Value (£million)	Value per tonne (£)	Quantity (Thousand tonnes)	Value (£million)	Value per tonne (£)	Quantity (Thousand tonnes)	Value (£million)	Value per tonne (£)
Imports (c.i.f.)												
Middle East												
Abu Dhabi	-	-	-	-	-	-	-	-	-	-	-	-
Dubai	-	-	-	-	-	-	-	-	-	-	-	-
Iran	-	-	-	-	-	-	-	-	-	40	12.3	306.58
Kuwait	-	-	-	-	-	-	-	-	-	-	-	-
Oman	-	-	-	-	-	-	-	-	-	-	-	-
Saudi Arabia	1,358	293.0	215.85	-	-	-	-	-	-	-	-	-
Other countries	489	110.0	224.97	979	242.4	247.60	164	30.2	184.00	255	97.7	382.74
Total Middle East	1,847	403.0	218.26	979	242.4	247.60	164	30.2	184.00	295	110.0	372.39
Algeria	1,157	294.4	254.51	2,178	617.5	283.48	2,523	734.2	290.96	1,586	718.9	453.16
Angola	-	-	-	-	-	-	498r	140.1r	281.55r	1,375	568.1	413.16
Latvia	-	-	-	-	-	-	-	-	-	-	-	-
Libya	548	120.9	220.52	1,126	302.2	268.45	927	235.0	253.50	1,967	839.0	426.52
Lithuania	-	-	-	-	-	-	-	-	-	-	-	-
Mexico	168	20.3	121.22	165	30.3	183.58	442	100.6	227.38	356	119.8	336.77
Netherlands	17	4.3	253.00	22	5.7	261.84	42r	13.6r	324.74r	85	30.7	362.16
Nigeria	388	95.4	245.93	539	141.3	262.39	885	250.4	283.04	1,991	790.7	397.09
Norway	40,072	8754.3	218.47	39,699	10484.7	264.11	34,197r	9,148.3r	267.52r	31,168	12152.9	389.92
Russia	6,986	1443.3	206.61	7,275r	1,937.4r	266.30r	5,400r	1,419.9r	262.94r	5,609	2184.4	389.47
Venezuela	1,449	151.2	104.38	1,915	339.4	177.24r	1,366	237.6	174.01	835	213.1	255.20
Other countries	759	114.5	150.84	1,028	273.7	266.34	1,460r	394.6r	270.22r	1,750	715.9	409.09
Total Non Middle East	51,543	10998.8	213.39	53,945r	14,132.2r	261.97r	47,740r	12,674.4r	265.49r	46,721	18333.5	392.40
Total imports	53,390	11401.8	213.56	54,924r	14,374.5r	261.72r	47,904r	12,704.6r	265.21r	47,017	18443.5	392.27
Exports (f.o.b.)(1)												
European Union												
Belgium and Luxembourg	135	31.8	235.65	152	45.3	298.79	155	45.5	293.39	332	124.0	373.61
Denmark	-	-	-	93	23.6	254.00	-	-	-	321	130.1	405.35
Finland	560	139.3	248.75	892	232.8	261.11	1,567	401.7	256.25	350	137.9	394.23
France	5,409	1,148.2	212.29	7,336	1,966.5	268.06	5,453	1,415.0	259.50	3,389	1284.0	378.88
Germany	13,150	2,869.8	218.23	11,095r	3,002.2r	270.60r	9,225	2,530.4	274.31	12,757	4892.7	383.52
Greece	-	-	-	-	-	-	-	-	-	-	-	-
Irish Republic	798	169.4	212.24	102	25.6	252.11	204	53.4	261.51	167	36.2	217.29
Italy	1,577	341.5	216.59	1,251	337.5	269.83	650	174.9	269.10	537	196.1	365.08
Netherlands	12,302	2,668.0	216.87	11,644	3,154.2	270.89	13,090	3,535.3	270.08	13,379	5267.9	393.73
Portugal	344	73.0	212.34	618	181.1	293.05	85	24.4	288.00	-	-	-
Spain	402	92.0	228.54	84	22.0	263.00	596	163.5	274.25	1,187	447.3	376.91
Sweden	1,131	235.0	207.88	1,113	300.3	269.77	769	207.7	270.28	760	299.8	394.33
Poland(2)	87	17.1	195.89	339	82.5	243.43	420	107.9	256.99	243	88.6	365.33
Total EU	35,896	7785.3	216.89	34,718r	9,373.9r	270.00r	32,214	8,659.8	268.82	33,421	12904.6	386.12
Canada	1,711	318.4	186.15	2,404	651.0	270.76	1,239	300.3	242.38	584	250.7	429.49
Norway	948	208.1	219.40	301	78.2	259.80	1,222	359.5	294.27	407	119.6	293.76
U.S.A.	13,554	2854.9	210.62	10,980	2,914.6	265.43	11,471	3,101.4	270.37	10,452	3930.9	376.08
Total Non EU	525	90.9	173.10	916	245.0	267.37	613	171.7	280.27	826	388.5	470.19
Total exports	52,634	11257.5	213.88	49,320r	13,262.7r	268.91r	46,758	12,592.7	269.32	45,691	17594.4	385.07

(1) Includes re-exports.

(2) Poland Joined the EU in May 2004, before this time any data for Poland is included in the Non EU category.

Source: HM Revenue and Customs

G.5 Imports and exports of solid fuel

Thousand tonnes

2001	Imports (1)				Exports			
	Steam coal	Coking coal	Anthracite	Other solid fuel	Steam coal	Coking coal	Anthracite	Other solid fuel
European Union								
Austria	-	-	-	-	-	-	-	-
Belgium/Luxembourg	6	-	-	56	-	-	68	1
Denmark	-	-	-	-	12	-	4	-
Finland	-	-	-	-	-	-	-	36
France	-	-	-	7	9	-	78	29
Germany	-	-	-	52	2	-	22	18
Irish Republic	64	-	9	-	210	4	24	25
Italy	-	-	-	-	-	-	-	5
Netherlands (2)	150	-	7	-	1	-	1	12
Portugal	-	-	-	-	-	-	-	-
Spain	-	-	-	1	-	-	12	-
Sweden	5	-	-	-	-	-	4	55
Total European Union	224	-	16	116	234	4	213	181
Australia	2,283	4,777	16	-	-	-	-	-
Canada	-	1,182	-	-	-	-	-	-
Colombia	6,722	-	-	-	-	-	-	-
Indonesia	50	-	-	-	-	-	-	-
Norway	23	-	1	1	63	-	26	180
People's Republic of China	295	-	410	48	-	-	-	-
Poland	1,183	-	52	-	-	-	-	-
Republic of South Africa	10,139	29	91	-	-	-	1	-
Russia	3,894	-	1	-	-	-	-	-
United States of America	857	1,735	18	-	-	-	-	-
Venezuela	56	-	-	-	-	-	-	-
Vietnam	-	-	92	-	-	-	-	-
Other countries	1,315	-	81	-	5	-	4	33
Total all countries	27,041	7,723	778	165	301	4	244	394
Value of imports (cif)/export (fob) (£m) (3)	839	285	34	14	19	0	13	26
Value per tonne (£)	32	37	44	64	47	67	66	66
2002								
European Union								
Belgium/Luxembourg	-	-	2	86	1	-	58	1
Denmark	-	-	-	-	13	-	5	-
Finland	-	-	-	-	-	-	-	38
France	5	-	12	12	2	-	61	114
Germany	10	-	-	15	32	-	15	50
Irish Republic	32	-	14	12	214	2	27	34
Italy	-	-	-	-	-	-	1	1
Netherlands (2)	226	-	31	96	-	-	2	11
Portugal	-	-	-	-	-	-	-	1
Spain	9	-	-	-	-	-	-	-
Sweden	25	-	-	-	3	-	6	51
Total European Union (5)	307	-	59	220	264	2	175	300
Australia	682	4,229	182	1	-	-	-	-
Canada	-	750	-	-	-	-	-	-
Colombia	3,518	-	29	-	-	-	-	-
Indonesia	45	-	-	-	-	-	-	-
Norway	163	-	1	-	74	-	14	153
People's Republic of China	208	-	80	41	-	-	-	-
Poland	1,558	1	38	25	-	-	-	-
Republic of South Africa	9,608	-	267	-	-	-	-	-
Russia	3,563	48	757	57	-	-	-	-
United States of America	252	1,286	29	-	-	-	-	-
Vietnam	-	-	86	-	-	-	-	-
Other countries	917	-	23	26	3	-	1	23
Total all countries	20,821	6,315	1,550	370	341	2	191	476
Value of imports (cif)/export (fob) (£m) (3)	588	240	53	24	19	0	11	31
Value per tonne (£)	27	38	34	64	56	87	59	66

G.5 Imports and exports of solid fuel (continued)

Thousand tonnes

2003	Imports (1)				Exports			
	Steam coal	Coking coal	Anthracite	Other solid fuel	Steam coal	Coking coal	Anthracite	Other solid fuel
European Union								
Belgium/Luxembourg	-	-	12	65	-	-	79	3
Denmark	-	-	-	-	13	-	-	-
Finland	-	-	-	-	-	-	-	41
France	5	-	14	14	-	-	52	37
Germany	-	-	2	14	1	-	-	1
Greece	-	-	-	-	-	-	2	-
Irish Republic	46	-	11	11	267	2	35	38
Italy	-	14	-	11	-	-	-	-
Netherlands (2)	243	-	3	41	-	-	-	2
Spain	21	-	-	-	-	-	-	-
Sweden	-	-	-	8	-	-	5	47
Total European Union (5)	314	14	41	161	281	2	175	170
Australia	1,162	4,409	-	-	-	-	-	-
Canada	-	839	-	-	-	-	1	-
Colombia	3,006	158	-	8	-	-	-	-
Indonesia	402	-	-	-	-	-	-	-
Latvia	1,441	-	-	-	-	-	-	-
Norway	145	-	-	15	75	-	3	121
People's Republic of China	170	-	40	470	-	-	-	-
Poland	1,896	-	6	-	-	-	-	-
Republic of South Africa	11,649	433	110	-	-	-	-	-
Russia	3,288	98	14	181	-	-	-	-
United States of America	167	1,089	45	-	-	-	-	-
Venezuela	41	-	-	-	-	-	-	-
Vietnam	-	-	45	-	-	-	-	-
Other countries	772	80	17	150	3	-	2	-
Total all countries	24,452	7,120	319	986	359	2	181	291
Value of imports (cif)/export (fob) (£m) (3)	653	256	15	71	20	0	13	21
Value per tonne (£)	27	36	48	72	55	90	71	71
2004								
European Union								
Belgium/Luxembourg	6	-	5	18	-	-	65	2
Denmark	-	-	-	1	1	-	-	-
Estonia (4)	-	-	22	-	-	-	-	-
Finland	-	-	-	-	-	-	-	36
France	32	-	14	8	-	-	51	36
Germany	8	-	5	50	-	-	8	5
Irish Republic	34	-	6	8	346	5	25	33
Italy	-	-	-	37	-	-	-	3
Latvia (4)	-	-	11	5	-	-	-	-
Netherlands (2)	183	-	10	38	-	5	4	12
Poland (4)	1,205	-	3	18	-	-	-	-
Portugal	8	-	-	-	-	-	-	-
Spain	24	-	-	-	8	-	-	-
Sweden	-	-	-	19	7	-	-	47
Total European Union (5)	1,500	-	76	199	362	9	154	175
Australia	2,035	4,140	-	25	-	-	-	-
Canada	25	715	-	18	-	-	1	-
Colombia	3,630	-	-	53	-	-	-	-
Indonesia	1,458	-	-	-	-	-	-	-
Norway	138	-	-	2	74	-	13	56
People's Republic of China	190	-	43	432	-	-	-	-
Republic of South Africa	10,039	-	105	-	-	-	-	-
Russia	9,711	148	73	142	-	-	-	-
United States of America	717	1,342	2	-	-	-	-	-
Venezuela	39	-	-	-	-	-	-	-
Vietnam	-	-	23	-	-	-	-	-
Other countries	-	-	-	179	3	-	2	6
Total all countries	29,483	6,345	320	1,050	440	9	170	237
Value of imports (cif)/export (fob) (£m) (3)	1,046	269	16	151	25	1	11	23
Value per tonne (£)	35	42	49	144	57	91	66	96

G.5 Imports and exports of solid fuel (continued)

Thousand tonnes

2005	Imports (1)				Exports			
	Steam coal	Coking coal	Anthracite	Other solid fuel	Steam coal	Coking coal	Anthracite	Other solid fuel
European Union								
Austria	-	-	-	-	-	-	-	5
Belgium/Luxembourg	-	-	14	20	-	-	84	2
Czech Republic	-	-	-	1	-	-	-	-
Denmark	-	-	-	-	4	-	-	-
Estonia (4)	15	-	-	-	-	-	-	-
Finland	-	-	-	-	-	-	-	36
France	-	-	4	-	1	-	32	20
Germany	12	-	4	41	1	-	-	5
Irish Republic	24	-	14	8	280	15	27	25
Italy	-	-	-	5	-	-	-	-
Latvia (4)	90r	28	-	-	-	-	-	-
Netherlands (2)	197	-	-	70	-	-	3	14
Poland (4)	647	-	-	24	-	-	-	1
Spain	41	-	-	3	-	-	-	-
Sweden	-	-	-	36	3	-	2	53
Total European Union (5)	1,027	28	37	209	290	15	148	162
Australia	808	3,499	156	-	-	-	-	-
Canada	-	1,084	-	-	-	-	1	-
Colombia	3,289	-	-	-	-	-	-	-
Indonesia	1,616	-	-	-	-	-	-	-
Norway	-	-	-	-	65	-	20	46
People's Republic of China	110	-	25	367	-	-	-	-
Republic of South Africa	12,980	-	49	-	-	-	-	-
Russia	16,748	697	76	125	-	-	-	-
United States of America	299	1,210	-	-	-	-	-	-
Other countries	225	-	-	27	8	-	3	1
Total all countries	37,101	6,519	343	728	363	15	172	209
Value of imports (cif)/export (fob) (£m) (3)	1,436	418	19	86	25	2	13	26
Value per tonne (£)	39	64	56	118	70	113	76	125
2006								
European Union								
Belgium/Luxembourg	-	-	2	26	3	-	65	1
Czech Republic	-	-	-	-	1	-	-	-
Denmark	10	-	-	-	5	-	-	-
Estonia (4)	37	-	-	-	-	-	-	-
Finland	-	-	-	-	-	-	-	20
France	3	-	2	-	-	-	24	23
Germany	44	-	6	35	-	-	4	11
Irish Republic	16	-	3	7	248	1	24	18
Latvia (4)	384	-	-	-	-	-	-	-
Netherlands (2)	188	-	-	42	-	-	3	22
Poland (4)	856	-	-	31	-	-	-	-
Spain	46	-	-	-	64	-	-	-
Sweden	-	-	-	29	-	-	-	3
Total European Union (5)	1,584	-	13	170	320	1	121	97
Australia	143	3,914	-	-	-	-	-	-
Canada	-	1,282	-	-	-	-	1	-
Colombia	3,798	-	-	-	-	-	-	-
Iceland	-	-	-	-	17	-	-	-
Indonesia	1,895	-	-	-	-	-	-	-
Norway	-	20	-	2	9	-	7	24
People's Republic of China	34	-	10	226	-	-	-	-
Republic of South Africa	12,601	-	41	-	-	-	-	-
Russia	21,950	298	37	168	-	-	-	-
United States of America	692	1,332	-	-	-	-	-	-
Vietnam	-	-	19	-	-	-	-	-
Other countries	-	28	2	10	2	-	2	1
Total all countries	42,697	6,875	123	577	349	1	131	122
Value of imports (cif)/export (fob) (£m) (3)	1,616	481	9	52	24	0	10	14
Value per tonne (£)	38	70	75	90	70	127	78	115

G.5 Imports and exports of solid fuel (continued)

Thousand tonnes

2007	Imports (1)				Exports			
	Steam coal	Coking coal	Anthracite	Other solid fuel	Steam coal	Coking coal	Anthracite	Other solid fuel
European Union								
Belgium/Luxembourg	-	-	1	12	3	-	45	12
Czech Republic	-	-	-	-	1	-	-	-
Denmark	7	-	-	-	6	5	-	-
Estonia (4)	66	-	-	-	-	-	-	-
Finland	-	-	-	-	-	-	-	40
France	-	-	-	3	-	-	13	39
Germany	8	-	5	29	-	-	3	98
Irish Republic	22	-	1	6	283	-	23	13
Italy	-	7	-	-	-	-	-	-
Latvia (4)	69	61	-	-	-	-	-	-
Netherlands (2)	170	-	-	125	1	-	9	22
Poland (4)	130	-	-	2	-	-	-	-
Spain	11	-	-	-	117	-	-	-
Sweden	-	-	-	27	-	-	-	9
Total European Union (5)	482	68	8	204	410	5	94	233
Australia	527	4,218	-	1	-	-	-	-
Canada	-	1,662	-	-	-	-	5	-
Colombia	3,800	-	72	-	-	-	-	-
Indonesia	1,455	-	-	-	-	-	-	-
Iceland	-	-	-	-	7	-	-	-
Norway	-	42	-	-	8	4	15	19
People's Republic of China	175	68	12	550	-	-	-	-
Republic of South Africa	7,706	-	23	-	-	-	-	-
Russia	19,692	393	21	159	-	-	-	-
United States of America	1,121	1,402	-	-	-	-	-	-
Other countries	-	29	-	20	2	3	2	22
Total all countries	34,957	7,883	135	933	428	13	116	274
Value of imports (cif)/export (fob) (£m) (3)	1,470	473	8	121	31	1	10	28
Value per tonne (£)	42	60	57	130	72	99	85	102
2008								
European Union								
Belgium/Luxembourg	24	-	2	13	22	123	66	3
Czech Republic	-	-	1	-	1	-	-	-
Denmark	8	-	-	-	2	18	-	-
Finland	-	-	-	-	-	-	-	37
France	-	-	-	-	1	-	57	93
Germany	15	-	3	32	-	-	3	93
Irish Republic	32	-	3	5	313	-	32	16
Latvia (4)	382	-	-	-	-	-	-	-
Netherlands (2)	146	-	2	142	103	37	9	-
Poland (4)	213	-	-	3	-	-	-	-
Spain	123	-	-	15	217	-	2	3
Sweden	-	-	-	33	-	-	-	6
Total European Union (5)	943	-	11	244	658	178	168	250
Australia	638	3,303	-	-	-	-	-	-
Bosnia & Herz.	-	-	-	48	-	-	-	-
Canada	-	1,412	-	18	-	-	3	-
Colombia	5,270	-	-	38	-	-	-	-
Egypt	-	-	-	38	-	-	1	-
India	-	-	-	-	-	-	1	-
Indonesia	2,088	-	-	-	-	-	-	-
Norway	-	-	-	-	11	-	14	38
People's Republic of China	-	-	14	63	-	-	-	-
Republic of South Africa	4,185	-	12	-	-	-	-	-
Russia	20,641	300	160	148	-	-	-	-
Turkey	-	-	-	90	-	-	-	-
United States of America	2,741	1,527	16	-	-	-	-	-
Venezuela	8	-	-	-	-	-	-	-
Other countries	-	-	-	1	3	-	1	2
Total all countries	36,514	6,542	213	688	671	178	188	291
Value of imports (cif)/export (fob) (£m) (3)	2,791	690	28	152	65	12	17	44
Value per tonne (£)	76	105	130	222	96	67	88	153

(1) Country of origin basis.

Source : H.M. Revenue and Customs

(2) Includes extra-EU coal routed through the Netherlands.

(3) Value of imports are "cif" (cost, insurance and freight) and value of exports are "fob" (free on board).

See technical note for fuller definition.

(4) Joined the EU on 1 May 2004

(5) Includes a small quantity from other EU countries

G.6 Physical imports and exports of gas, 1997 to 2008 ⁽¹⁾

	GWh											
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Imports												
Interconnector via Belgium (2)	-	692	471	2,955	4,015	6,645	4,387	25,592	24,108	30,505	6,471	12,174
Netherlands (3)	-	-	-	-	-	-	-	-	-	9,135	76,602	90,563
Norway (4)	14,061	9,374	7,020	11,279	12,734	37,886	71,753	95,359	127,895	157,035	225,764	283,722
Liquefied Natural Gas (LNG) (5)	-	-	-	-	-	-	-	-	5,453	37,576	14,903	8,912
<i>of which from:</i>												
Algeria	-	-	-	-	-	-	-	-	4,575	20,718	6,605	3,113
Egypt	-	-	-	-	-	-	-	-	0	12,465	1,751	0
Qatar	-	-	-	-	-	-	-	-	0	779	2,693	0
Trinidad & Tobago	-	-	-	-	-	-	-	-	878	3,614	3,854	5,799
Total Imports	14,061	10,066	7,491	14,234	16,749	44,531	76,140	120,951	157,456	234,251	323,740	395,371
Exports												
Interconnector via Belgium (2)	-	1,761	45,459	94,574	80,846	91,189	122,648	60,060	36,641	60,195	51,390	45,949
Netherlands (6)	10,481	10,550	8,816	7,723	5,640	4,837	3,424	2,887	4,261	3,371	6,358	10,389
Norway (7)	-	-	-	-	-	-	-	-	-	-	153	389
Republic of Ireland (8)	11,184	18,776	24,723	32,248	38,129	38,743	40,806	39,084	39,407	47,247	50,972	54,260
Total Exports	21,665	31,087	78,998	134,545	124,615	134,769	166,878	102,031	80,309	110,813	108,873	110,987
Net Imports (9)	-7,604	-21,021	-71,507	-120,311	-107,866	-90,238	-90,738	+18,920	+77,147	+123,438	+214,867	+284,384

Source: DECC

(1) See paragraph G23.

(2) Physical flows of gas through the Bacton-Zeebrugge Interconnector as opposed to the nominated flows used by National Grid.

(3) Via the Bacton-Balgzand (BBL) pipeline. Commissioned in November 2006.

(4) Currently via the Langeled and Vesterled pipelines, and the Tampen Link (from Statfjord to the FLAGS pipeline and then onto St Fergus).

Prior to 2005 includes the Norwegian share of the Frigg field.

(5) From various sources to the Isle of Grain and Gasport Teesside.

(6) Direct exports from the Grove, Chiswick, Markham, Minke and Windermere offshore gas fields using the Dutch offshore gas pipeline infrastructure.

(7) With effect from September 2007, UK gas from the Blane field to the Norwegian Ula field for injection into the Ula reservoir.

(8) Includes gas to the Isle of Man for which separate figures are not available.

(9) A negative figure means the UK was a net exporter of gas.

Annex H

Flow charts

Introduction

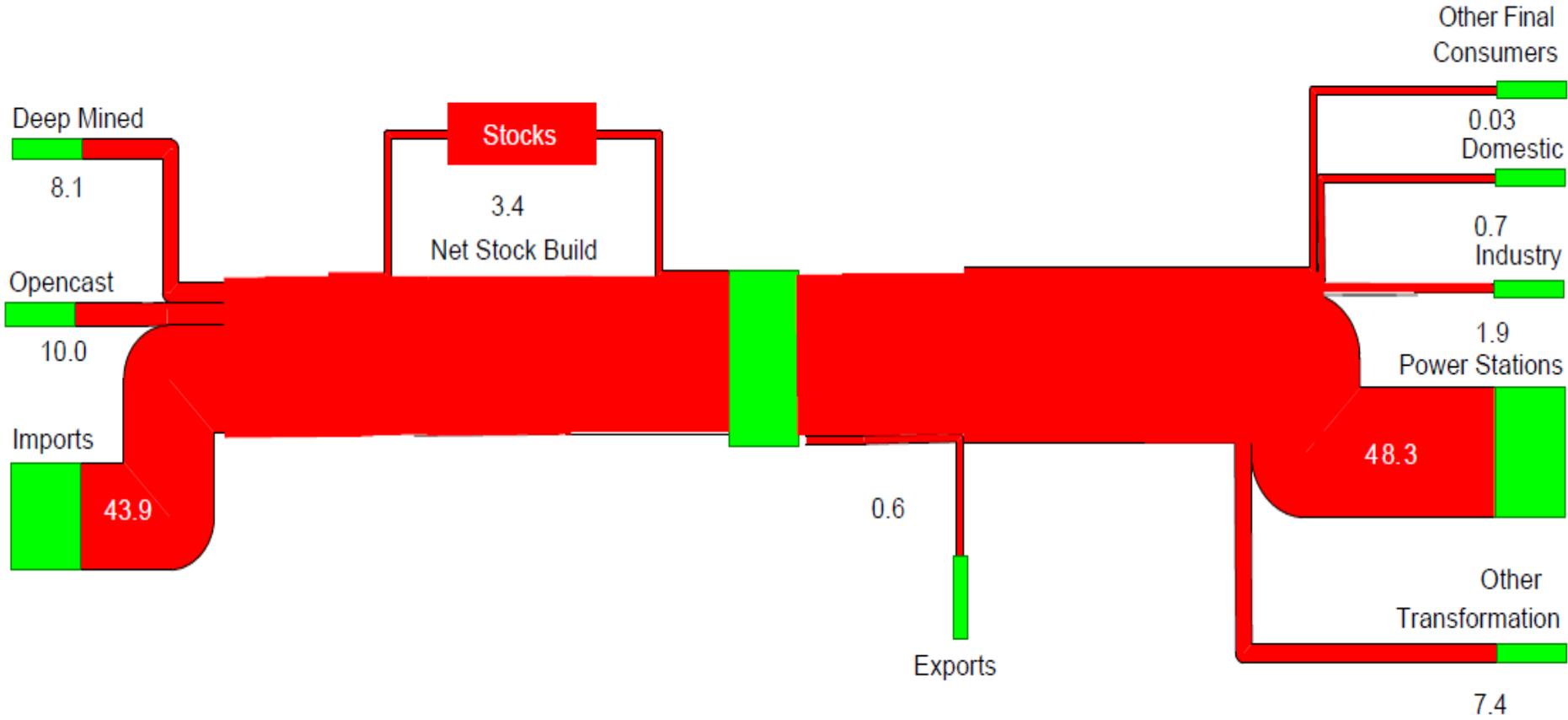
H.1 This section brings together the flow charts for individual fuels contained in the main Digest publication. Chart H.1 is for Coal, Chart H.2 is for Petroleum, Chart H.3 is for Gas, Chart H.4 is for Electricity and Chart H.5 is for Renewables. Annual updates will appear in subsequent editions of the main Digest publication and in the internet version of the Digest on the DECC website.

Summary flow chart

H.2 A summary flow chart, UK Energy Flow Chart 2008, is also available on the DECC website at: www.decc.gov.uk/en/content/cms/statistics/publications/flow/flow.aspx. The summary flow chart updates the last energy flow chart which showed data for 2007. It is based on statistics taken from the main Digest publication, Table 1.1 – Energy Balance 2008. The chart is a simplification of the energy balance figures, illustrating the flow of primary fuels from the point at which they become available from home production or imports (on the left) to their eventual final uses (on the right). They are shown in their original state and after being converted into different kinds of energy by the secondary fuel producers. The flows are measured in million tonnes of oil equivalent, with the widths of the bands approximately proportional to the size of the flow they represent. The flow charts for individual fuels have been produced on a similar basis.

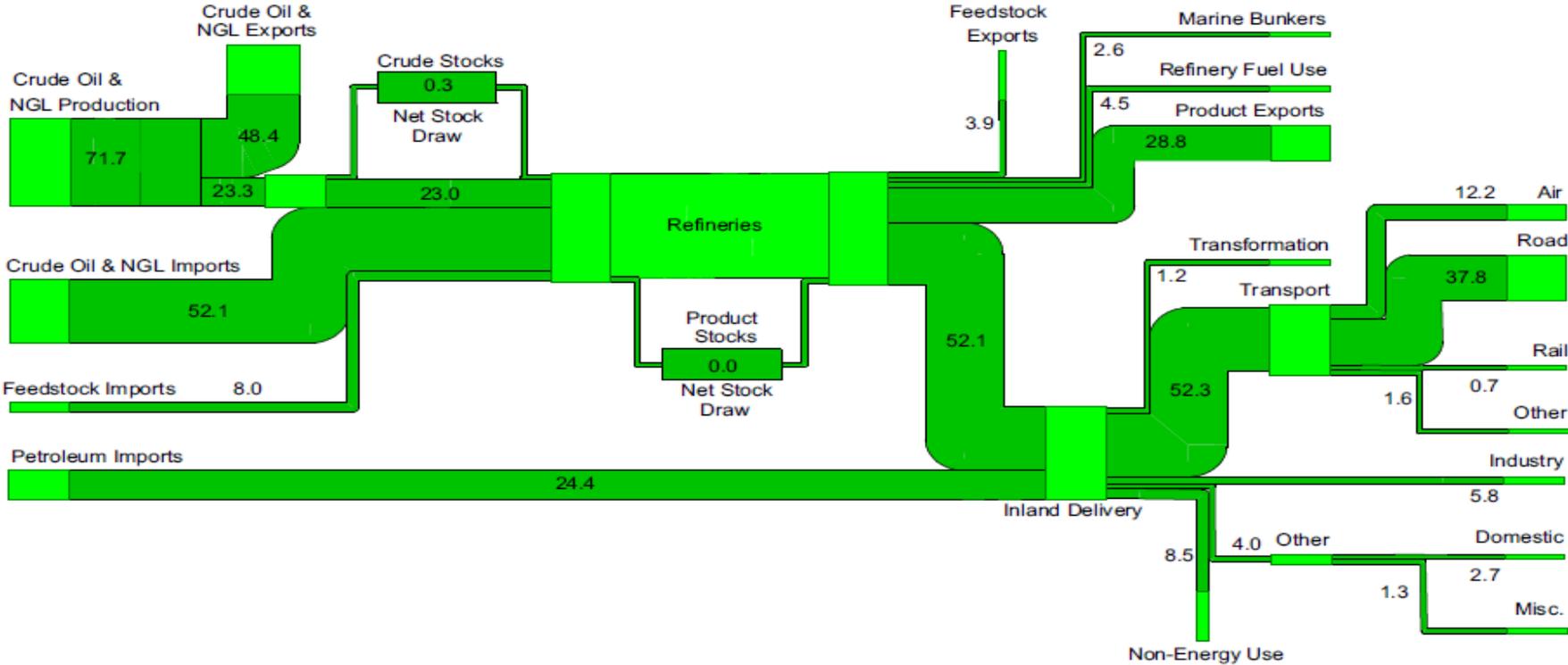
Contact: Kevin Harris
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Chart H.1: Coal flow chart 2008 (million tonnes of coal)



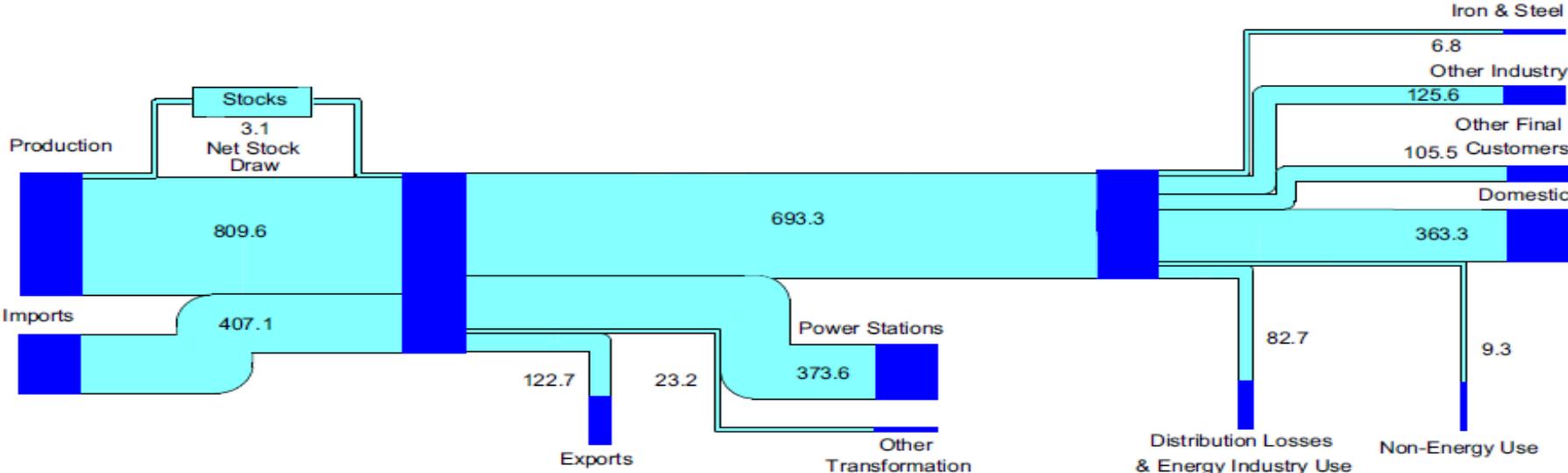
Notes:
 This flow chart is based on the data that appear in Tables 2.1 and 2.7.
 Opencast includes slurry and recovered coal.

Chart H.2: Petroleum flow chart 2008 (million tonnes)



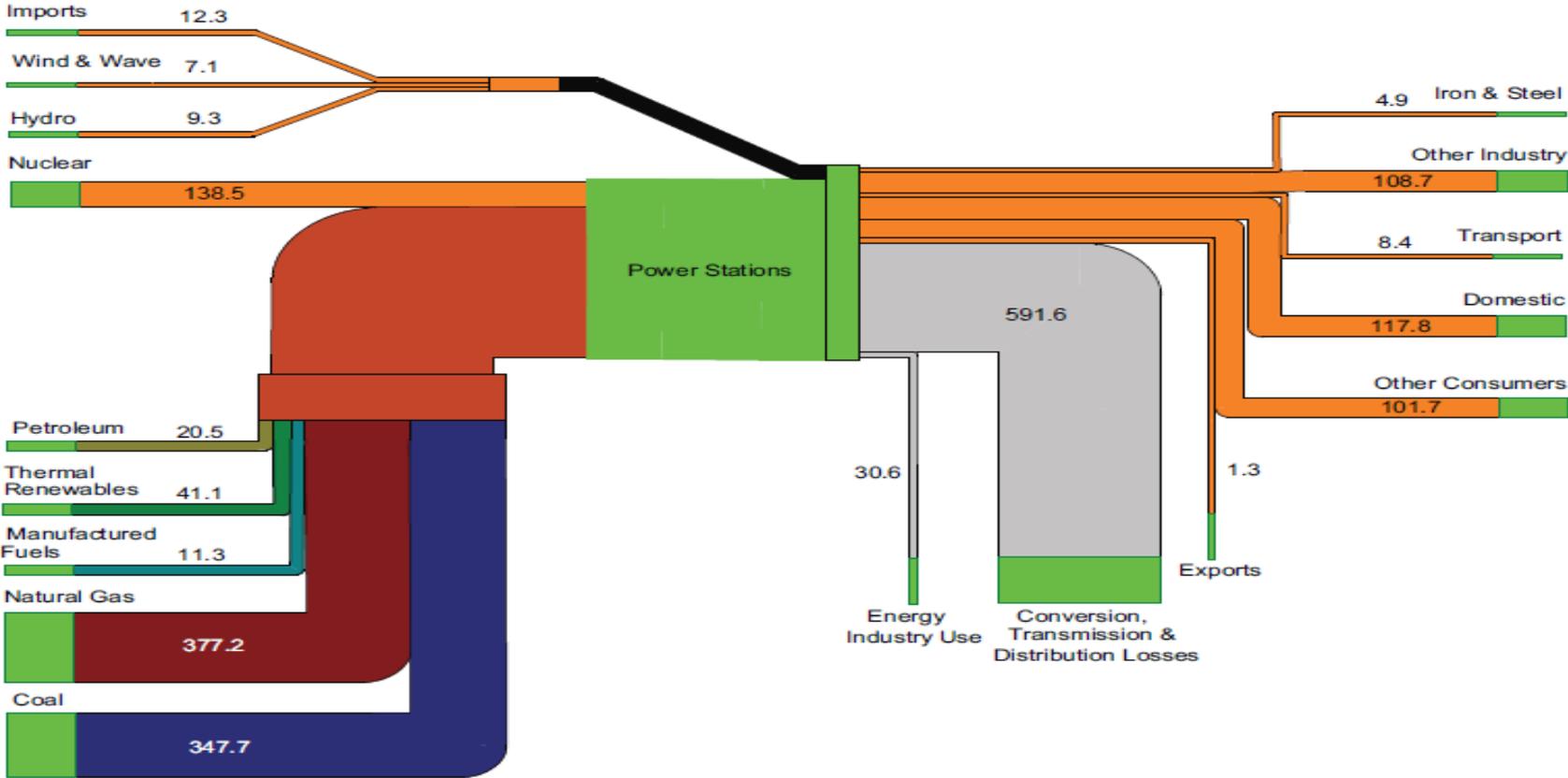
Note:
This flow chart is based on the data that appear in Tables 3.1 and 3.2.

Chart H.3: Natural gas flow chart 2008 (TWh)



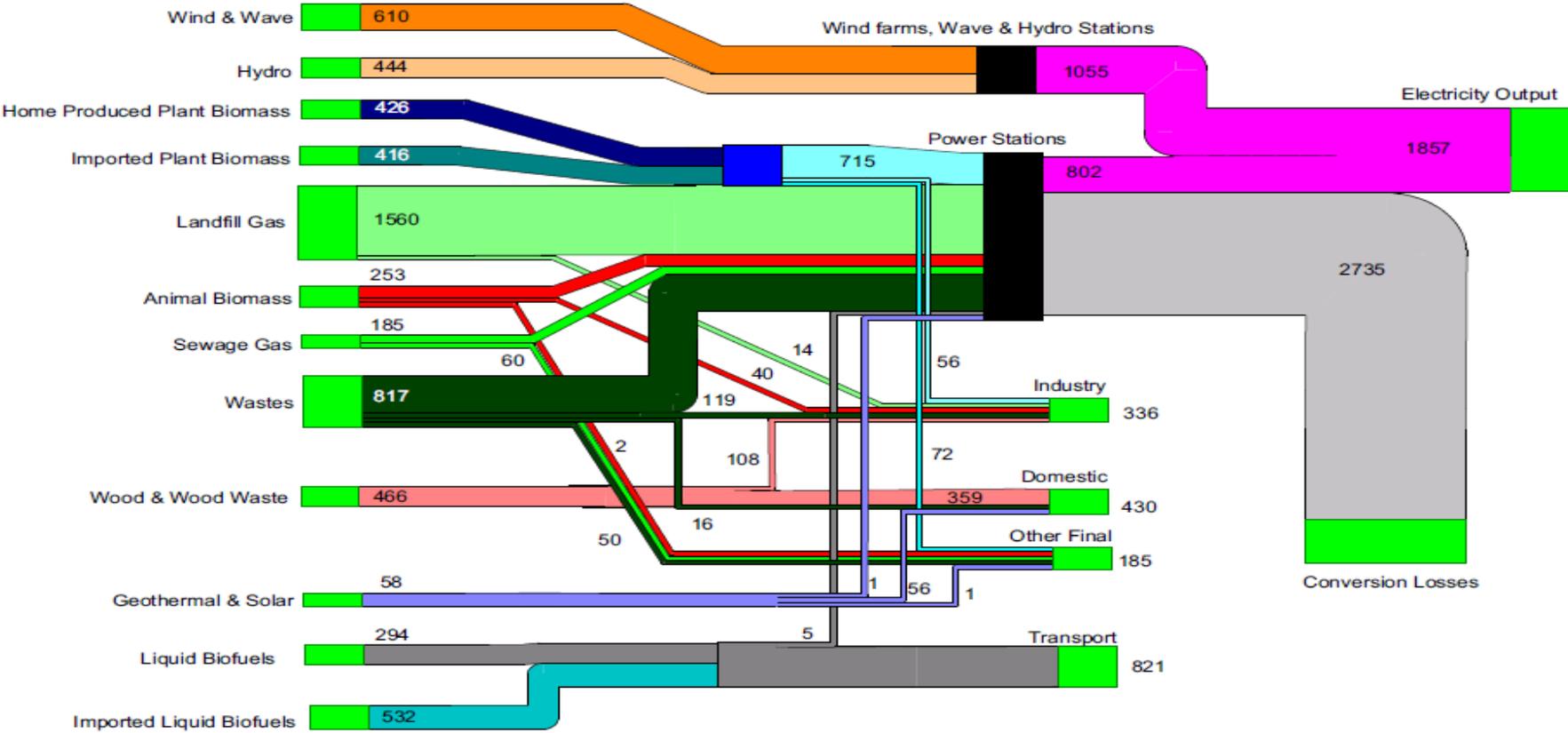
Note:
This flow chart is based on the data that appear in Table 4.1, excluding colliery methane.

Chart H.4: Electricity flow chart 2008 (TWh)



Notes:
 This flow chart is based on the data in Tables 5.1(for imports, exports, use, losses and consumption) and 5.6 (fuel used).
 (1) Includes solar photovoltaics.
 (2) Hydro includes generation from pumped storage while electricity used in pumping is included under Energy Industry Use.

Chart H.5: Renewables flow chart 2008 (thousand tonnes of oil equivalent)



Note:
This flow chart is based on data that appear in Tables 7.1 and 7.4.

Annex I

Energy balance: Net Calorific Values

Aggregate energy balance (Table I.1)

I.1 These tables show the flows of energy in the United Kingdom from production to final consumption through conversion into secondary fuels such as coke, petroleum products, secondary electricity and heat sold using Net Calorific Values (NCV). The NCVs used are detailed in annex A of DUKES.

I.2 A key reason for showing these balances on a NCV basis is to enable comparisons with EU statistics, which use this method. This approach has been used when comparing EU Member States' shares of renewables in final energy consumption, as set out on page 24 of the March 2008 Energy Trends article, Renewable energy: Statistics used for the EU 2020 renewables target, available at:

www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx.

I.3 The principles behind the presentation used in the Digest are explained in Annex A. The figures are presented on an energy supplied basis, in tonnes of oil equivalent.

I.4 These energy balance tables have been used in the calculation of the percentage of energy derived from renewable sources, detailed in table 7B on page 188 of DUKES. The contribution of renewables has continued to grow in recent years, with the share reaching 2.3 per cent in 2008.

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I.1 Aggregate energy balance 2008: NCV

Thousand tonnes of oil equivalent

	Coal	Manufactured fuel(1)	Primary oils	Petroleum products	Natural gas(2)	Renewable & waste(3)	Primary electricity	Electricity	Heat	Total
Supply										
Indigenous production	10,794	-	74,538	-	62,705	3,603	12,965	-	-	164,604
Imports	26,997	500	62,317	24,664	31,500	871	-	1,057	-	147,906
Exports	-434	-141	-50,295	-29,590	-9,493	-	-	-109	-	-90,062
Marine bunkers	-	-	-	-2,569	-	-	-	-	-	-2,569
Stock change(4)	-2,045	156	242	10	-239	-	-	-	-	-1,875
Primary supply	35,311	515	86,802	-7,484	84,473	4,474	12,965	948	-	218,003
Statistical difference(5)	-153	-10	-116	-61	+68	-0	-	+91	-	-183
Primary demand	35,464	525	86,918	-7,423	84,405	4,474	12,965	857	-	218,186
Transfers	-	-127	-3,237	+3,245	-5	-	-1,056	+1,056	-	-124
Transformation	-33,774	1,584	-83,681	81,726	-30,741	-2,976	-11,909	32,096	1,281	-46,395
Electricity generation	-28,415	-839	-	-926	-28,949	-2,976	-11,909	32,096	-	-41,918
Major power producers	-27,539	-	-	-363	-26,393	-628	-11,909	29,374	-	-37,458
Autogenerators	-876	-839	-	-563	-2,556	-2,348	-	2,723	-	-4,460
Heat generation	-271	-48	-	-57	-1,792	-	-	-	1,281	-887
Petroleum refineries	-	-	-83,681	82,912	-	-	-	-	-	-769
Coke manufacture	-4,066	3,966	-	-	-	-	-	-	-	-101
Blast furnaces	-810	-1,718	-	-204	-	-	-	-	-	-2,732
Patent fuel manufacture	-212	223	-	-	-	-	-	-	-	12
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	4	806	-	4,479	5,355	-	-	2,282	72	12,997
Electricity generation	-	-	-	-	-	-	-	1,403	-	1,403
Oil and gas extraction	-	-	-	-	4,743	-	-	51	-	4,795
Petroleum refineries	-	-	-	4,479	146	-	-	438	72	5,135
Coal extraction	4	-	-	-	7	-	-	84	-	95
Coke manufacture	-	392	-	-	-	-	-	7	-	399
Blast furnaces	-	414	-	0	56	-	-	39	-	508
Patent fuel manufacture	-	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	110	-	110
Other	-	-	-	-	403	-	-	149	-	552
Losses	-	232	-	-	1,055	-	-	2,358	-	3,646
Final consumption	1,687	945	-	73,068	47,249	1,498	-	29,369	1,209	155,025
Industry	1,185	717	-	5,990	10,254	293	-	9,764	773	28,975
Unclassified	-	219	-	2,291	3	293	-	-	-	2,806
Iron and steel	1	498	-	11	528	-	-	419	-	1,456
Non-ferrous metals	19	-	-	44	256	-	-	609	-	927
Mineral products	721	-	-	163	858	-	-	667	-	2,409
Chemicals	87	-	-	165	2,784	-	-	1,818	361	5,215
Mechanical engineering etc	9	-	-	92	598	-	-	712	3	1,415
Electrical engineering etc	4	-	-	44	302	-	-	600	-	949
Vehicles	32	-	-	109	668	-	-	481	-	1,290
Food, beverages etc	27	-	-	265	2,005	-	-	1,051	2	3,350
Textiles, leather etc	51	-	-	98	472	-	-	274	-	895
Paper, printing etc	99	-	-	61	826	-	-	1,137	1	2,125
Other industries	134	-	-	2,497	754	-	-	1,867	406	5,658
Construction	-	-	-	149	200	-	-	129	-	479
Transport (6)	-	-	-	54,151	-	798	-	725	-	55,675
Air	-	-	-	12,755	-	-	-	-	-	12,755
Rail	-	-	-	702	-	-	-	725	-	1,427
Road	-	-	-	39,036	-	798	-	-	-	39,834
National navigation	-	-	-	1,658	-	-	-	-	-	1,658
Pipelines	-	-	-	-	-	-	-	-	-	-
Other	502	227	-	4,203	36,278	407	-	18,880	437	60,933
Domestic	490	227	-	2,869	28,115	246	-	10,132	52	42,133
Public administration	5	-	-	444	3,659	90	-	1,901	376	6,474
Commercial	4	-	-	377	2,937	8	-	6,496	10	9,833
Agriculture	3	-	-	284	167	63	-	350	-	867
Miscellaneous	0	-	-	228	1,398	0	-	-	-	1,627
Non energy use	-	-	-	8,724	718	-	-	-	-	9,442

(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.

(2) Includes colliery methane.

(3) Includes geothermal and solar heat.

(4) Stock fall (+), stock rise (-).

(5) Primary supply minus primary demand.

(6) See paragraph 5.11 regarding electricity use in transport

I.1 Aggregate energy balance 2007: NCV

Thousand tonnes of oil equivalent

	Coal	Manufactured fuel(1)	Primary oils	Petroleum products	Natural gas(2)	Renewable & waste(3)	Primary electricity	Electricity	Heat	Total
Supply										
Indigenous production	10,161r	-	79,939r	-	64,912	3,623r	14,928	-	-	173,563r
Imports	26,787r	732r	59,230	26,016r	26,159	321	-	741	-	139,986r
Exports	-398r	-170r	-52,968r	-30,885r	-9,531	-40r	-	-292	-	-94,283r
Marine bunkers	-	-	-	-2,362r	-	-	-	-	-	-2,362r
Stock change(4)	1,769r	-22	814	1,029r	424	-	-	-	-	4,014r
Primary supply	38,320r	540r	87,015r	-6,202r	81,964	3,904r	14,928	448	-	220,918r
Statistical difference(5)	+35r	-14r	-106r	-75r	+73r	-0r	-	+85r	-	-3r
Primary demand	38,285r	554r	87,121r	-6,126r	81,891r	3,904r	14,928	364r	-	220,920r
Transfers	-	-127	-2,977r	+3,006r	-6	-	-892	+892	-	-104r
Transformation	-36,627r	1,639	-84,144r	82,945r	-28,992r	-2,929r	-14,036	32,916r	1,196r	-48,033r
Electricity generation	-31,230r	-919	-	-634r	-27,297r	-2,929r	-14,036	32,916r	-	-44,129r
Major power producers	-30,376r	-	-	-198r	-24,752r	-522r	-14,036	30,081r	-	-39,803r
Autogenerators	-853r	-919	-	-435r	-2,545r	-2,408r	-	2,835r	-	-4,326r
Heat generation	-272	-48	-	-56r	-1,695r	-	-	-	1,196r	-876r
Petroleum refineries	-	-	-84,144r	83,832r	-	-	-	-	-	-311r
Coke manufacture	-4,103	4,071	-	-	-	-	-	-	-	-32
Blast furnaces	-859	-1,633	-	-197r	-	-	-	-	-	-2,689r
Patent fuel manufacture	-163	168	-	-	-	-	-	-	-	4
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	4	837	-	4,424r	5,669r	-	-	2,544r	68r	13,545r
Electricity generation	-	-	-	-	-	-	-	1,522r	-	1,522r
Oil and gas extraction	-	-	-	-	4,970	-	-	48	-	5,019
Petroleum refineries	-	-	-	4,424r	189r	-	-	576r	68r	5,256r
Coal extraction	4	-	-	-	7	-	-	85	-	95
Coke manufacture	-	388	-	-	0r	-	-	8	-	396r
Blast furnaces	-	449	-	0r	56	-	-	41	-	546
Patent fuel manufacture	-	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	104	-	104
Other	-	-	-	-	447	-	-	160r	-	607r
Losses	-	213	-	-	934	-	-	2,276r	-	3,422r
Final consumption	1,654r	1,016r	-	75,401r	46,289r	975r	-	29,352r	1,128r	155,816r
Industry	1,178r	832	-	6,420r	10,467r	242r	-	10,061r	690r	29,891r
Unclassified	-	220	-	2,485r	3	242r	-	-	-	2,949r
Iron and steel	1	613	-	19r	566r	-	-	423	-	1,621r
Non-ferrous metals	21r	-	-	45	262	-	-	630r	-	959r
Mineral products	721r	-	-	185r	868	-	-	676r	-	2,450r
Chemicals	87	-	-	181r	2,845r	-	-	1,909r	277r	5,298r
Mechanical engineering etc	7	-	-	101r	605r	-	-	732r	-r	1,445r
Electrical engineering etc	4	-	-	33r	305r	-	-	627r	-	969r
Vehicles	33	-	-	115r	684r	-	-	493r	-	1,325r
Food, beverages etc	28r	-	-	252r	2,025r	-	-	1,056r	2r	3,363r
Textiles, leather etc	50	-	-	112r	494	-	-	288	-	943r
Paper, printing etc	96	-	-	61r	837r	-	-	1,148r	1	2,144r
Other industries	132r	-	-	2,672r	765r	-	-	1,940r	411	5,920r
Construction	-	-	-	159r	208	-	-	137	-	504r
Transport (6)	-	-	-	55,854r	-	349r	-	696r	-	56,899r
Air	-	-	-	13,220r	-	-	-	-	-	13,220r
Rail	-	-	-	659r	-	-	-	696r	-	1,355r
Road	-	-	-	40,454r	-	349r	-	-	-	40,803r
National navigation	-	-	-	1,521r	-	-	-	-	-	1,521r
Pipelines	-	-	-	-	-	-	-	-	-	-
Other	476	184r	-	4,134r	35,031r	384r	-	18,595r	438r	59,241r
Domestic	463	184r	-	2,725r	27,313r	227r	-	9,893	52	40,856r
Public administration	5	-	-	458r	3,443r	81r	-	1,921r	376	6,285r
Commercial	4	-	-	384r	2,782	14r	-	6,426r	9	9,619r
Agriculture	3	-	-	275	155	63	-	355r	-	849r
Miscellaneous	1	-	-	292r	1,339r	0r	-	-	-	1,633r
Non energy use	-	-	-	8,993r	792r	-	-	-	-	9,784r

(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.

(2) Includes colliery methane.

(3) Includes geothermal and solar heat.

(4) Stock fall (+), stock rise (-).

(5) Primary supply minus primary demand.

(6) See paragraph 5.11 regarding electricity use in transport

I.1 Aggregate energy balance 2006: NCV

Thousand tonnes of oil equivalent

	Coal	Manufactured fuel(1)	Primary oils	Petroleum products	Natural gas(2)	Renewable & waste(3)	Primary electricity	Electricity	Heat	Total
Supply										
Indigenous production	10,847r	-	79,694r	-	72,011	3,265r	17,889	-	-	183,706r
Imports	31,035r	691	61,664	27,758r	18,884	422r	-	884	-	141,338r
Exports	-325	-119	-52,130r	-29,723r	-9,332	-48r	-	-238	-	-91,915r
Marine bunkers	-	-	-	-2,337r	-	-	-	-	-	-2,337r
Stock change(4)	-767r	-152	-370r	-866r	-498	-	-	-	-	-2,653r
Primary supply	40,790r	420	88,857r	-5,169r	81,065	3,640r	17,889	646	-	228,138r
Statistical difference(5)	-95r	-5r	-106r	+63	+158r	-0r	-	+90r	-	+104r
Primary demand	40,885r	425r	88,963r	-5,232r	80,907r	3,640r	17,889	556r	-	228,034r
Transfers	-	-105	-2,617r	+2,658r	-4	-	-759	+759	-	-68r
Transformation	-39,386r	1,705	-86,346r	84,743r	-25,656r	-2,918r	-17,130	33,071r	1,305	-50,613r
Electricity generation	-34,055r	-948	-	-648r	-23,951r	-2,918r	-17,130	33,071r	-	-46,581r
Major power producers	-33,198r	-	-	-260r	-21,525r	-612r	-17,130	30,412r	-	-42,313r
Autogenerators	-857r	-948	-	-388r	-2,427r	-2,307r	-	2,659r	-	-4,268r
Heat generation	-272	-48	-	-57	-1,704	-	-	-	1,305	-776
Petroleum refineries	-	-	-86,346r	85,672r	-	-	-	-	-	-674r
Coke manufacture	-4,100	4,150	-	-	-	-	-	-	-	50
Blast furnaces	-775	-1,642	-	-224r	-	-	-	-	-	-2,640r
Patent fuel manufacture	-184	192	-	-	-	-	-	-	-	8
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	3	826	-	4,674r	6,132r	-	-	2,425r	60	14,119r
Electricity generation	-	-	-	-	-	-	-	1,591r	-	1,591r
Oil and gas extraction	-	-	-	-	5,359r	-	-	47	-	5,406r
Petroleum refineries	-	-	-	4,674r	197r	-	-	401r	60	5,331r
Coal extraction	3	-	-	-	9	-	-	89	-	100
Coke manufacture	-	377	-	-	0r	-	-	8	-	386r
Blast furnaces	-	448	-	-	47	-	-	43	-	538
Patent fuel manufacture	-	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	92	-	92
Other	-	-	-	-	520	-	-	155r	-	675r
Losses	-	173	-	-	929r	-	-	2,357r	-	3,459r
Final consumption	1,497	1,026r	-	77,495r	48,186r	722r	-	29,604r	1,245	159,775r
Industry	1,074r	820r	-	6,785r	11,278r	186r	-	10,139r	809	31,091r
Unclassified	-	213r	-	2,836r	4	186r	-	-	-	3,239r
Iron and steel	1r	607	-	18r	651	-	-	504	-	1,781r
Non-ferrous metals	34	-	-	50r	248	-	-	647r	-	979r
Mineral products	656r	-	-	188r	991r	-	-	685	-	2,521r
Chemicals	51r	-	-	181r	3,021r	-	-	1,925r	371	5,550r
Mechanical engineering etc	9	-	-	100r	672	-	-	730	2	1,512r
Electrical engineering etc	4	-	-	80r	319r	-	-	631r	-	1,034r
Vehicles	35	-	-	116r	717	-	-	503	-	1,372r
Food, beverages etc	16r	-	-	266r	2,150r	-	-	1,059	1	3,492r
Textiles, leather etc	47	-	-	123r	514	-	-	291	-	974r
Paper, printing etc	94	-	-	56	969r	-	-	1,153r	22	2,293r
Other industries	127r	-	-	2,608r	825r	-	-	1,870r	414	5,844r
Construction	-	-	-	163r	198	-	-	141	-	502r
Transport (6)	-	-	-	55,841r	-	180r	-	708r	-	56,729r
Air	-	-	-	13,303	-	-	-	-	-	13,303
Rail	-	-	-	683r	-	-	-	-	-	683r
Road	-	-	-	40,151r	-	180r	-	-	-	40,332r
National navigation	-	-	-	1,704r	-	-	-	-	-	1,704r
Pipelines	-	-	-	-	-	-	-	-	-	-
Other	423r	206r	-	4,513r	36,296r	355r	-	18,757r	436	60,985r
Domestic	403r	206r	-	3,078r	28,312r	202r	-	10,013	52	42,265r
Public administration	9	-	-	460r	3,778	77	-	1,908r	376	6,607r
Commercial	4	-	-	370r	2,653	14r	-	6,481	8	9,529r
Agriculture	3	-	-	286r	156	63r	-	355	-	863r
Miscellaneous	3	-	-	319r	1,398r	0r	-	-	-	1,721r
Non energy use	-	-	-	10,356r	612r	-	-	-	-	10,968r

(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.

(2) Includes colliery methane.

(3) Includes geothermal and solar heat.

(4) Stock fall (+), stock rise (-).

(5) Primary supply minus primary demand.

(6) See paragraph 5.11 regarding electricity use in transport

I.1 Aggregate energy balance 2005: NCV

Thousand tonnes of oil equivalent

	Coal	Manufactured fuel(1)	Primary oils	Petroleum products	Natural gas(2)	Renewable & waste(3)	Primary electricity	Electricity	Heat	Total
Supply										
Indigenous production	12,078r	-	88,164r	-	79,397	3,006	19,044	-	-	201,690r
Imports	27,107r	623	61,078	23,266r	13,413	354	-	960	-	126,801r
Exports	-399	-89	-56,209r	-30,521r	-7,443	-	-	-244	-	-94,904r
Marine bunkers	-	-	-	-2,050r	-	-	-	-	-	-2,050r
Stock change(4)	-1,335r	-98	-396r	+1,095r	+102	-	-	-	-	-632r
Primary supply	37,451r	437	92,637r	-8,210r	85,470	3,360	19,044	715	-	230,904r
Statistical difference(5)	+29r	-7	-103r	-160r	+244	+0	-	+209r	-	+212r
Primary demand	37,422r	444	92,740r	-8,050r	85,226	3,359	19,044	507r	-	230,691r
Transfers	-	-114	-3,380r	+3,389r	-4	-	-674	+674	-	-108r
Transformation	-35,815r	1,654	-89,360r	87,916r	-27,197	-2,832	-18,370	33,327r	1,366	-49,312r
Electricity generation	-30,788r	-971	-	-664r	-25,457	-2,832	-18,370	33,327r	-	-45,755r
Major power producers	-29,952r	-	-	-248r	-22,879	-686	-18,370	30,564	-	-41,570r
Autogenerators	-836r	-971	-	-416r	-2,578	-2,147	-	2,764r	-	-4,185r
Heat generation	-272	-48	-	-57r	-1,740	-	-	-	1,366	-751r
Petroleum refineries	-	-	-89,360r	88,900r	-	-	-	-	-	-460r
Coke manufacture	-3,851	3,930	-	-	-	-	-	-	-	79
Blast furnaces	-718	-1,446	-	-263r	-	-	-	-	-	-2,427r
Patent fuel manufacture	-187	190	-	-	-	-	-	-	-	3
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	4	777	-	5,656r	6,676	-	-	2,337r	98	15,547r
Electricity generation	-	-	-	-	-	-	-	1,532r	26	1,558r
Oil and gas extraction	-	-	-	-	5,678	-	-	43	-	5,721
Petroleum refineries	-	-	-	5,656r	331	-	-	383	71	6,441r
Coal extraction	4	-	-	-	9	-	-	92	-	104
Coke manufacture	-	359	-	-	-	-	-	8	-	367
Blast furnaces	-	418	-	-	73	-	-	44	-	535
Patent fuel manufacture	-	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	72r	-	72r
Other	-	-	-	-	586	-	-	162	-	748
Losses	-	207	-	-	848	-	-	2,380	-	3,435
Final consumption	1,603r	1,001	-	77,599r	50,500	527	-	29,791	1,268	162,289r
Industry	1,121r	787	-	6,795r	11,716	165	-	10,363	831	31,777r
Unclassified	-	209	-	2,507r	4	165	-	-	-	2,885r
Iron and steel	-	578	-	14	655	-	-	432	-	1,679
Non-ferrous metals	23	-	-	50	249	-	-	661	-	983r
Mineral products	702r	-	-	203r	1,029	-	-	686	-	2,620r
Chemicals	80	-	-	182r	3,178	-	-	2,074	392	5,907r
Mechanical engineering etc	9	-	-	111r	671	-	-	742	3	1,536r
Electrical engineering etc	3	-	-	33r	335	-	-	638	-	1,010
Vehicles	36	-	-	131r	794	-	-	502	-	1,463r
Food, beverages etc	18	-	-	304r	2,160	-	-	1,098	1	3,581r
Textiles, leather etc	47	-	-	104r	552	-	-	292	-	994r
Paper, printing etc	93	-	-	81r	1,059	-	-	1,180	31	2,444r
Other industries	110	-	-	2,898r	820	-	-	1,891	405	6,124r
Construction	-	-	-	178r	207	-	-	166	-	551r
Transport (6)	-	-	-	55,172r	-	-	-	758	-	55,930r
Air	-	-	-	13,160	-	-	-	-	-	13,160
Rail	-	-	-	665r	-	-	-	-	-	665r
Road	-	-	-	40,058r	-	-	-	-	-	40,058r
National navigation	-	-	-	1,289r	-	-	-	-	-	1,289r
Pipelines	-	-	-	-	-	-	-	-	-	-
Other	482	214	-	4,573r	38,035	362	-	18,670	437	62,773r
Domestic	450	214	-	2,926r	29,717	190	-	10,044	52	43,593r
Public administration	21	-	-	509r	3,894	96	-	1,795	376	6,691r
Commercial	4	-	-	365r	2,716	-	-	6,474	10	9,569r
Agriculture	6	-	-	339r	175	63	-	357	-	940r
Miscellaneous	1	-	-	433r	1,533	14	-	-	-	1,982r
Non energy use	-	-	-	11,060r	749	-	-	-	-	11,809r

(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.

(2) Includes colliery methane.

(3) Includes geothermal and solar heat.

(4) Stock fall (+), stock rise (-).

(5) Primary supply minus primary demand.

(6) See paragraph 5.11 regarding electricity use in transport

I.1 Aggregate energy balance 2004: NCV

Thousand tonnes of oil equivalent

	Coal	Manufactured fuel(1)	Primary oils	Petroleum products	Natural gas(2)	Renewable & waste(3)	Primary electricity	Electricity	Heat	Total
Supply										
Indigenous production	14,814	-	99,241r	-	86,770	2,525	18,746	-	-	222,096r
Imports	22,338	724	64,842	19,103r	10,295	337	-	841	-	118,480r
Exports	-426	-123	-66,985r	-31,255r	-8,831	-	-	-197	-	-107,816r
Marine bunkers	-	-	-	-2,088r	-	-	-	-	-	-2,088r
Stock change (4)	-53	-84	-140r	-307r	-483	-	-	-	-	-1,067r
Primary supply	36,673	517	96,958r	-14,547r	87,751	2,862	18,746	644	-	229,605r
Statistical difference (5)	+57	+49	-155r	-45r	+54	+0r	-	+211r	-	+171r
Primary demand	36,616	468	97,113r	-14,502r	87,697	2,862	18,746	433r	-	229,434r
Transfers	-	-118	-3,905r	+3,894r	-3	-	-583	+583	-	-132r
Transformation	-34,723	1,617	-93,208r	91,869r	-28,065	-2,320	-18,163	33,061r	1,273	-48,658r
Electricity generation	-29,796	-908	-	-608r	-26,375	-2,320	-18,163	33,061r	-	-45,109r
Major power producers	-28,946	-	-	-144r	-23,564	-441	-18,163	30,246	-	-41,012r
Autogenerators	-850	-908	-	-464r	-2,811	-1,878	-	2,815r	-	-4,097r
Heat generation	-282	-48	-	-67r	-1,690	-	-	-	1,273	-814
Petroleum refineries	-	-	-93,208r	92,835r	-	-	-	-	-	-373r
Coke manufacture	-3,797	3,886	-	-	-	-	-	-	-	89
Blast furnaces	-619	-1,541	-	-290r	-	-	-	-	-	-2,451r
Patent fuel manufacture	-229	229	-	-	-	-	-	-	-	-0r
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	5	804	-	5,499	6,846	-	-	2,291	16	15,462
Electricity generation	-	-	-	-	-	-	-	1,464	2	1,466
Oil and gas extraction	-	-	-	-	5,957	-	-	48	-	6,005
Petroleum refineries	-	-	-	5,498	238	-	-	402	14	6,152
Coal extraction	5	-	-	-	12	-	-	88	-	105
Coke manufacture	-	360	-	1	-	-	-	8	-	369
Blast furnaces	-	441	-	-	56	-	-	40	-	537
Patent fuel manufacture	-	3	-	-	-	-	-	-	-	3
Pumped storage	-	-	-	-	-	-	-	73	-	73
Other	-	-	-	-	583	-	-	167	-	750
Losses	-	194	-	-	635	-	-	2,642	-	3,472
Final consumption	1,888	969	-	75,761r	52,147	543	-	29,144	1,258	161,711r
Industry	1,173	714	-	6,506r	11,914	228	-	9,961	832	31,328r
Unclassified	-	139	-	2,477r	5	228	-	-	-	2,849r
Iron and steel	0r	575	-	33	752	-	-	465	-	1,825
Non-ferrous metals	7	-	-	49r	248	-	-	646	-	950
Mineral products	713	-	-	189r	1,037	-	-	674	-	2,613r
Chemicals	89	-	-	191r	3,250	-	-	1,817	394	5,741r
Mechanical engineering etc.	10	-	-	110r	666	-	-	732	2	1,520r
Electrical engineering etc.	3	-	-	36	322	-	-	585	-	946
Vehicles	53	-	-	103r	791	-	-	489	-	1,436r
Food, beverages, etc.	25	-	-	324r	2,185	-	-	1,062	2	3,598r
Textiles, leather, etc.	55	-	-	69r	551	-	-	293	-	968r
Paper, printing etc.	92	-	-	55r	1,074	-	-	1,175	27	2,424
Other industries	126	-	-	2,724r	806	-	-	1,867	407	5,929r
Construction	-	-	-	147r	227	-	-	155	-	529r
Transport (6)	-	-	-	53,917r	-	-	-	728	-	54,645r
Air	-	-	-	12,255	-	-	-	-	-	12,255
Rail	-	-	-	658r	-	-	-	-	-	658r
Road	-	-	-	39,880r	-	-	-	-	-	39,880r
National navigation	-	-	-	1,124r	-	-	-	-	-	1,124r
Pipelines	-	-	-	-	-	-	-	-	-	-
Other	715	255	-	4,440r	39,458	314	-	18,456	425	64,064r
Domestic	697	255	-	3,091r	30,677	143	-	9,933	52	44,847r
Public administration	9	-	-	474r	4,019	95	-	1,781	368	6,745r
Commercial	3	-	-	392r	2,909	-	-	6,381	5	9,692r
Agriculture	5	-	-	258r	182	63	-	361	-	868r
Miscellaneous	1	-	-	226r	1,671	14	-	-	-	1,912r
Non energy use	-	-	-	10,898r	775	-	-	-	-	11,673r

(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.

(2) Includes colliery methane.

(3) Includes geothermal and solar heat.

(4) Stock fall (+), stock rise (-).

(5) Primary supply minus primary demand.

(6) See paragraph 5.11 regarding electricity use in transport

Annex J

Heat reconciliation

Introduction

J.1 Heat sold has been separately identified in the energy balances since 1999. It is defined as heat that is produced and sold under the provision of a contract. The introduction of heat sold into the energy and commodity balances has not affected the individual fuel totals, since the energy used to generate the heat has been deducted from the final consumption section of the energy balances and transferred to the transformation section.

Methodology

J.2 The heat data are derived from two sources covering CHP plants and heating schemes without CHP plants. Data for heat sold are supplied by CHP plants to the Combined Heat and Power Quality Assurance Programme and are processed by AEA Energy and Environment. Data for heat consumption from other heating schemes were derived from the Building Research Establishment's "National Survey of Community Heating" that was carried out in 1997, a database of community heating schemes in social housing in 2000, and Community Heating Sales Surveys undertaken between 2003 and 2005. The estimates from these sources have been used to derive heat sold figures since 1999; it is recommended that the figures should be treated as indicative of the amount of heat sold.

J.3 To make the heat sold information more transparent, data on the quantity of fuel by consuming sector used to produce heat that is subsequently sold are being made available in the tables that accompany this annex. When producing the energy and commodity balances the quantities of fuel shown in the tables have been deducted from the final consumption section and moved to the transformation section.

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J.1 Heat sold reallocation 2008

	ktonnes	GWh	GWh	GWh	ktonnes	ktonnes	ktonnes	ktoe
	Coal	Coke oven gas	Blast furnace gas	Natural gas	Fuel oil	Gas oil	Propane	Wood waste
Supply	-	-	-	-	-	-	-	-
Indigenous production	-	-	-	-	-	-	-	-
Imports	-	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-	-	-
Stock change	-	-	-	-	-	-	-	-
Primary supply	-	-	-	-	-	-	-	-
Statistical difference	-	-	-	-	-	-	-	-
Primary demand	-	-	-	-	-	-	-	-
Transfers	-	-	-	-	-	-	-	-
Transformation	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	-	-	-
Heat generation	-458	-418	-179	-23,161	-52	-5	-5	-38
Petroleum refineries	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	804	-	-	5	-
Coal extraction	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-
Final consumption	-	-	-	-	-	-	-	-
Industry	-	-	-	-	-	-	-	-
Unclassified	-	62	-	-	-	-	-	-
Iron and steel	-	357	179	395	4	0	-	-
Non-ferrous metals	17	-	-	213	1	0	-	-
Mineral products	-	-	-	237	4	0	-	-
Chemicals	266	-	-	7,046	20	0	-	31
Mechanical engineering etc	1	-	-	284	2	0	-	-
Electrical engineering etc	0	-	-	61	1	0	-	-
Vehicles	7	-	-	474	3	0	-	-
Food, beverages etc	24	-	-	1,331	8	0	-	-
Textiles, leather etc	3	-	-	159	2	0	-	-
Paper, printing etc	7	-	-	1,464	4	0	-	-
Other industries	3	-	-	2,258	3	4	-	-
Construction	-	-	-	0	1	-	-	-
Transport	-	-	-	-	-	-	-	-
Air	-	-	-	-	-	-	-	-
Rail	-	-	-	-	-	-	-	-
Road	-	-	-	-	-	-	-	-
National navigation	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Domestic	-	-	-	-	-	-	-	-
Public administration	130	-	-	4,287	-	0	-	-
Commercial	0	-	-	4,148	-	0	-	7
Agriculture	-	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-	-

J.1 Heat sold reallocation 2007

	ktonnes	GWh	GWh	GWh	ktonnes	ktonnes	ktonnes	ktoe
	Coal	Coke oven gas	Blast furnace gas	Natural gas	Fuel oil	Gas oil	Propane	Wood waste
Supply	-	-	-	-	-	-	-	-
Indigenous production	-	-	-	-	-	-	-	-
Imports	-	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-	-	-
Stock change	-	-	-	-	-	-	-	-
Primary supply	-	-	-	-	-	-	-	-
Statistical difference	-	-	-	-	-	-	-	-
Primary demand	-	-	-	-	-	-	-	-
Transfers	-	-	-	-	-	-	-	-
Transformation	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	-	-	-
Heat generation	-456	-418	-179	-21,909	-52	-5	-4	-38
Petroleum refineries	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	783	-	0	4	-
Coal extraction	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-
Final consumption	-	-	-	-	-	-	-	-
Industry	-	-	-	-	-	-	-	-
Unclassified	-	62	-	-	-	-	-	-
Iron and steel	-	357	179	395	4	0	-	-
Non-ferrous metals	17	-	-	213	1	0	-	-
Mineral products	-	-	-	237	4	0	-	-
Chemicals	265	-	-	5,794	20	0	-	31
Mechanical engineering etc	1	-	-	234	2	0	-	-
Electrical engineering etc	0	-	-	61	1	0	-	-
Vehicles	7	-	-	474	3	0	-	-
Food, beverages etc	24	-	-	1,331	8	0	-	-
Textiles, leather etc	3	-	-	159	2	0	-	-
Paper, printing etc	7	-	-	1,506	4	0	-	-
Other industries	3	-	-	2,258	3	4	-	-
Construction	-	-	-	0	1	-	-	-
Transport	-	-	-	-	-	-	-	-
Air	-	-	-	-	-	-	-	-
Rail	-	-	-	-	-	-	-	-
Road	-	-	-	-	-	-	-	-
National navigation	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Domestic	-	-	-	-	-	-	-	-
Public administration	130	-	-	4,289	-	0	-	-
Commercial	-	-	-	4,175	-	1	-	7
Agriculture	-	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-	-

J.1 Heat sold reallocation 2006

	ktonnes	GWh	GWh	GWh	ktonnes	ktonnes	ktonnes	ktoe
	Coal	Coke oven gas	Blast furnace gas	Natural gas	Fuel oil	Gas oil	Propane	Wood waste
Supply	-	-	-	-	-	-	-	-
Indigenous production	-	-	-	-	-	-	-	-
Imports	-	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-	-	-
Stock change	-	-	-	-	-	-	-	-
Primary supply	-	-	-	-	-	-	-	-
Statistical difference	-	-	-	-	-	-	-	-
Primary demand	-	-	-	-	-	-	-	-
Transfers	-	-	-	-	-	-	-	-
Transformation	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	-	-	-
Heat generation	-457	-418	-179	-22,023	-53	-6	-4	-43
Petroleum refineries	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	683	-	0	4	-
Coal extraction	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-
Final consumption	-	-	-	-	-	-	-	-
Industry	-	-	-	-	-	-	-	-
Unclassified	-	62	-	-	-	-	-	-
Iron and steel	-	357	179	395	4	0	-	-
Non-ferrous metals	17	-	-	213	1	0	-	-
Mineral products	-	-	-	237	4	0	-	-
Chemicals	266	-	-	5,816	20	0	-	31
Mechanical engineering etc	1	-	-	234	2	0	-	5
Electrical engineering etc	0	-	-	61	1	0	-	-
Vehicles	7	-	-	474	3	0	-	-
Food, beverages etc	24	-	-	1,312	8	0	-	-
Textiles, leather etc	3	-	-	159	2	0	-	-
Paper, printing etc	7	-	-	1,744	4	0	-	-
Other industries	3	-	-	2,258	3	4	-	1
Construction	-	-	-	0	1	-	-	-
Transport	-	-	-	-	-	-	-	-
Air	-	-	-	-	-	-	-	-
Rail	-	-	-	-	-	-	-	-
Road	-	-	-	-	-	-	-	-
National navigation	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Domestic	-	-	-	-	-	-	-	-
Public administration	130	-	-	4,270	-	0	-	-
Commercial	-	-	-	4,167	-	1	-	5
Agriculture	-	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-	-

J.1 Heat sold reallocation 2005

	ktonnes	GWh	GWh	GWh	ktonnes	ktonnes	ktonnes	ktoe
	Coal	Coke oven gas	Blast furnace gas	Natural gas	Fuel oil	Gas oil	Propane	Wood waste
Supply	-	-	-	-	-	-	-	-
Indigenous production	-	-	-	-	-	-	-	-
Imports	-	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-	-	-
Stock change	-	-	-	-	-	-	-	-
Primary supply	-	-	-	-	-	-	-	-
Statistical difference	-	-	-	-	-	-	-	-
Primary demand	-	-	-	-	-	-	-	-
Transfers	-	-	-	-	-	-	-	-
Transformation	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	-	-	-
Heat generation	-459	-418	-179	-22,488	-52	-6	-39	-36
Petroleum refineries	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	810	-	0	4	-
Coal extraction	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-
Final consumption	-	-	-	-	-	-	-	-
Industry	-	-	-	-	-	-	-	-
Unclassified	-	62	-	-	-	-	-	-
Iron and steel	-	357	179	395	4	0	-	-
Non-ferrous metals	17	-	-	213	1	0	-	-
Mineral products	-	-	-	237	4	0	-	-
Chemicals	267	-	-	5,850	20	0	34	31
Mechanical engineering etc	1	-	-	246	2	0	-	5
Electrical engineering etc	0	-	-	61	1	0	-	-
Vehicles	7	-	-	474	3	0	-	-
Food, beverages etc	24	-	-	1,313	8	0	-	-
Textiles, leather etc	3	-	-	159	2	0	-	-
Paper, printing etc	7	-	-	1,960	4	0	-	-
Other industries	3	-	-	2,258	3	4	-	-
Construction	-	-	-	0	1	-	-	-
Transport	-	-	-	-	-	-	-	-
Air	-	-	-	-	-	-	-	-
Rail	-	-	-	-	-	-	-	-
Road	-	-	-	-	-	-	-	-
National navigation	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Domestic	-	-	-	-	-	-	-	-
Public administration	130	-	-	4,369	0	0	-	-
Commercial	-	-	-	4,145	0	1	-	-
Agriculture	-	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-	-

J.1 Heat sold reallocation 2004

	ktonnes	GWh	GWh	GWh	ktonnes	ktonnes	ktonnes	ktoe
	Coal	Coke oven gas	Blast furnace gas	Natural gas	Fuel oil	Gas oil	Propane	Wood waste
Supply	-	-	-	-	-	-	-	-
Indigenous production	-	-	-	-	-	-	-	-
Imports	-	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-	-	-
Stock change	-	-	-	-	-	-	-	-
Primary supply	-	-	-	-	-	-	-	-
Statistical difference	-	-	-	-	-	-	-	-
Primary demand	-	-	-	-	-	-	-	-
Transfers	-	-	-	-	-	-	-	-
Transformation	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	-	-	-
Heat generation	-473	-418	-179	-21,844	-52	-16	-1	-39
Petroleum refineries	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	162	-	0	1	-
Coal extraction	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-
Final consumption	-	-	-	-	-	-	-	-
Industry	-	-	-	-	-	-	-	-
Unclassified	-	62	-	-	-	-	-	-
Iron and steel	-	357	179	395	4	0	-	-
Non-ferrous metals	37	-	-	213	1	0	-	-
Mineral products	-	-	-	237	4	0	-	-
Chemicals	209	-	-	6,080	20	2	-	31
Mechanical engineering etc	1	-	-	269	2	0	-	-
Electrical engineering etc	0	-	-	61	1	0	-	-
Vehicles	7	-	-	474	3	0	-	-
Food, beverages etc	27	-	-	1,314	8	0	-	-
Textiles, leather etc	3	-	-	159	2	0	-	-
Paper, printing etc	17	-	-	1,813	4	0	-	-
Other industries	43	-	-	2,296	3	4	-	-
Construction	-	-	-	0	1	-	-	-
Transport	-	-	-	-	-	-	-	-
Air	-	-	-	-	-	-	-	-
Rail	-	-	-	-	-	-	-	-
Road	-	-	-	-	-	-	-	-
National navigation	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Domestic	-	-	-	-	-	-	-	-
Public administration	130	-	-	4,281	0	8	-	-
Commercial	-	-	-	4,090	-	1	-	7
Agriculture	-	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-	-

J.1 Heat sold reallocation 2003

	ktonnes	GWh	GWh	GWh	ktonnes	ktonnes	ktonnes	ktoe
	Coal	Coke oven gas	Blast furnace gas	Natural gas	Fuel oil	Gas oil	Propane	Wood waste
Supply	-	-	-	-	-	-	-	-
Indigenous production	-	-	-	-	-	-	-	-
Imports	-	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-	-	-
Stock change	-	-	-	-	-	-	-	-
Primary supply	-	-	-	-	-	-	-	-
Statistical difference	-	-	-	-	-	-	-	-
Primary demand	-	-	-	-	-	-	-	-
Transfers	-	-	-	-	-	-	-	-
Transformation	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	-	-	-
Heat generation	-622	-1,055	-299	-19,830	-133	-18	-1	-64
Petroleum refineries	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-
Final consumption	-	-	-	-	-	-	-	-
Industry	-	-	-	-	-	-	-	-
Unclassified	-	201	-	-	-	-	1	64
Iron and steel	0	854	299	132	7	0	-	-
Non-ferrous metals	58	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-	-
Chemicals	306	-	-	3,757	14	0	-	-
Mechanical engineering etc	2	-	-	239	6	1	-	-
Electrical engineering etc	1	-	-	-	3	-	-	-
Vehicles	18	-	-	-	2	-	-	-
Food, beverages etc	22	-	-	735	22	1	-	-
Textiles, leather etc	1	-	-	-	-	-	-	-
Paper, printing etc	25	-	-	1,662	6	0	-	-
Other industries	48	-	-	2,380	33	9	-	-
Construction	-	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-	-
Air	-	-	-	-	-	-	-	-
Rail	-	-	-	-	-	-	-	-
Road	-	-	-	-	-	-	-	-
National navigation	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Domestic	-	-	-	-	-	-	-	-
Public administration	141	-	-	5,713	34	4	-	-
Commercial	-	-	-	5,212	6	3	-	-
Agriculture	-	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-	-

J.1 Heat sold reallocation 2002

	ktonnes	GWh	GWh	GWh	ktonnes	ktonnes	ktonnes	ktoe
	Coal	Coke oven gas	Blast furnace gas	Natural gas	Fuel oil	Gas oil	Propane	Wood waste
Supply	-	-	-	-	-	-	-	-
Indigenous production	-	-	-	-	-	-	-	-
Imports	-	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-	-	-
Stock change	-	-	-	-	-	-	-	-
Primary supply	-	-	-	-	-	-	-	-
Statistical difference	-	-	-	-	-	-	-	-
Primary demand	-	-	-	-	-	-	-	-
Transfers	-	-	-	-	-	-	-	-
Transformation	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	-	-	-
Heat generation	-717	-1,486	-422	-22,009	-227	-23	-	-63
Petroleum refineries	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-
Final consumption	-	-	-	-	-	-	-	-
Industry	-	-	-	-	-	-	-	-
Unclassified	-	283	-	-	-	-	-	63
Iron and steel	0	1,203	422	185	11	0	-	-
Non-ferrous metals	81	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-	-
Chemicals	299	-	-	4,817	23	1	-	-
Mechanical engineering etc	2	-	-	268	11	1	-	-
Electrical engineering etc	2	-	-	-	4	-	-	-
Vehicles	25	-	-	-	4	-	-	-
Food, beverages etc	29	-	-	1,035	38	1	-	-
Textiles, leather etc	2	-	-	-	-	-	-	-
Paper, printing etc	45	-	-	2,076	11	0	-	-
Other industries	68	-	-	2,576	57	12	-	-
Construction	-	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-	-
Air	-	-	-	-	-	-	-	-
Rail	-	-	-	-	-	-	-	-
Road	-	-	-	-	-	-	-	-
National navigation	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Domestic	-	-	-	-	-	-	-	-
Public administration	163	-	-	6,017	57	5	-	-
Commercial	-	-	-	5,035	10	2	-	-
Agriculture	-	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-	-

J.1 Heat sold reallocation 2001

	ktonnes	GWh	GWh	GWh	ktonnes	ktonnes	ktonnes	ktoe
	Coal	Coke oven gas	Blast furnace gas	Natural gas	Fuel oil	Gas oil	Propane	Wood waste
Supply	-	-	-	-	-	-	-	-
Indigenous production	-	-	-	-	-	-	-	-
Imports	-	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-	-	-
Stock change	-	-	-	-	-	-	-	-
Primary supply	-	-	-	-	-	-	-	-
Statistical difference	-	-	-	-	-	-	-	-
Primary demand	-	-	-	-	-	-	-	-
Transfers	-	-	-	-	-	-	-	-
Transformation	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	-	-	-
Heat generation	-750	-1,875	-532	-23,586	-640	-31	-1	-72
Petroleum refineries	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-
Final consumption	-	-	-	-	-	-	-	-
Industry	-	-	-	-	-	-	-	-
Unclassified	-	357	-	-	-	-	1	72
Iron and steel	0	1,518	532	200	33	0	-	-
Non-ferrous metals	59	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-	-
Chemicals	298	-	-	3,977	51	1	-	-
Mechanical engineering etc	3	-	-	365	31	2	-	-
Electrical engineering etc	1	-	-	-	12	-	-	-
Vehicles	17	-	-	-	11	-	-	-
Food, beverages etc	58	-	-	923	111	1	-	-
Textiles, leather etc	12	-	-	-	-	-	-	-
Paper, printing etc	44	-	-	1,838	31	0	-	-
Other industries	35	-	-	2,380	165	16	-	-
Construction	-	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-	-
Air	-	-	-	-	-	-	-	-
Rail	-	-	-	-	-	-	-	-
Road	-	-	-	-	-	-	-	-
National navigation	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Domestic	-	-	-	-	-	-	-	-
Public administration	223	-	-	7,649	166	7	-	-
Commercial	-	-	-	6,253	29	4	-	-
Agriculture	-	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-	-

J.1 Heat sold reallocation 2000

	ktonnes	GWh	GWh	GWh	ktonnes	ktonnes	ktonnes	ktoe
	Coal	Coke oven gas	Blast furnace gas	Natural gas	Fuel oil	Gas oil	Propane	Wood waste
Supply	-	-	-	-	-	-	-	-
Indigenous production	-	-	-	-	-	-	-	-
Imports	-	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-	-	-
Stock change	-	-	-	-	-	-	-	-
Primary supply	-	-	-	-	-	-	-	-
Statistical difference	-	-	-	-	-	-	-	-
Primary demand	-	-	-	-	-	-	-	-
Transfers	-	-	-	-	-	-	-	-
Transformation	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	-	-	-
Heat generation	-656	-1,810	-619	-24,891	-659	-33	-17	-95
Petroleum refineries	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-
Final consumption	-	-	-	-	-	-	-	-
Industry	-	-	-	-	-	-	-	-
Unclassified	-	141	-	-	-	-	17	95
Iron and steel	1	1,670	619	141	22	1	-	-
Non-ferrous metals	62	-	-	-	-	-	-	-
Mineral products	-	-	-	-	-	-	-	-
Chemicals	140	-	-	5,652	142	3	-	-
Mechanical engineering etc	5	-	-	211	21	2	-	-
Electrical engineering etc	1	-	-	-	14	-	-	-
Vehicles	34	-	-	-	11	-	-	-
Food, beverages etc	86	-	-	963	83	1	-	-
Textiles, leather etc	20	-	-	-	-	-	-	-
Paper, printing etc	44	-	-	2,525	27	0	-	-
Other industries	46	-	-	1,171	216	15	-	-
Construction	-	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-	-
Air	-	-	-	-	-	-	-	-
Rail	-	-	-	-	-	-	-	-
Road	-	-	-	-	-	-	-	-
National navigation	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Domestic	-	-	-	-	-	-	-	-
Public administration	217	-	-	7,898	92	7	-	-
Commercial	-	-	-	6,330	30	3	-	-
Agriculture	-	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-
Non energy use	-	-	-	-	-	-	-	-

J.1 Heat sold reallocation 1999

	ktonnes		GWh	GWh	GWh	ktonnes	ktonnes	ktonnes	ktoe
	Coal	Coke oven gas	Blast furnace gas	Natural gas	Fuel oil	Gas oil	Propane	Wood waste	
Supply	-	-	-	-	-	-	-	-	-
Indigenous production	-	-	-	-	-	-	-	-	-
Imports	-	-	-	-	-	-	-	-	-
Exports	-	-	-	-	-	-	-	-	-
Marine bunkers	-	-	-	-	-	-	-	-	-
Stock change	-	-	-	-	-	-	-	-	-
Primary supply	-	-	-	-	-	-	-	-	-
Statistical difference	-	-	-	-	-	-	-	-	-
Primary demand	-	-	-	-	-	-	-	-	-
Transfers	-	-	-	-	-	-	-	-	-
Transformation	-	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	-	-	-	-	-	-
Heat generation	-649	-1,749	-1,109	-26,185	-657	-33	-16	-104	
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Energy industry use	-	-	-	-	-	-	-	-	-
Electricity generation	-	-	-	-	-	-	-	-	-
Oil and gas extraction	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-	-
Final consumption	-	-	-	-	-	-	-	-	-
Industry	-	53	-	-	-	-	16	104	
Unclassified	-	53	-	-	-	-	16	104	
Iron and steel	5	1,696	1,109	142	31	0	-	-	
Non-ferrous metals	10	-	-	-	-	-	-	-	
Mineral products	-	-	-	-	-	-	-	-	
Chemicals	297	-	-	4,488	98	3	-	-	
Mechanical engineering etc	9	-	-	65	29	2	-	-	
Electrical engineering etc	3	-	-	-	10	-	-	-	
Vehicles	29	-	-	-	16	-	-	-	
Food, beverages etc	85	-	-	1,000	104	1	-	-	
Textiles, leather etc	21	-	-	-	-	-	-	-	
Paper, printing etc	45	-	-	3,500	34	0	-	-	
Other industries	4	-	-	988	149	16	-	-	
Construction	-	-	-	-	-	-	-	-	
Transport	-	-	-	-	-	-	-	-	
Air	-	-	-	-	-	-	-	-	
Rail	-	-	-	-	-	-	-	-	
Road	-	-	-	-	-	-	-	-	
National navigation	-	-	-	-	-	-	-	-	
Pipelines	-	-	-	-	-	-	-	-	
Other	-	-	-	-	-	-	-	-	
Domestic	-	-	-	-	-	-	-	-	
Public administration	142	-	-	8,903	155	7	-	-	
Commercial	-	-	-	7,100	32	4	-	-	
Agriculture	-	-	-	-	-	-	-	-	
Miscellaneous	-	-	-	-	-	-	-	-	
Non energy use	-	-	-	-	-	-	-	-	

Chapter 1: Long term trends

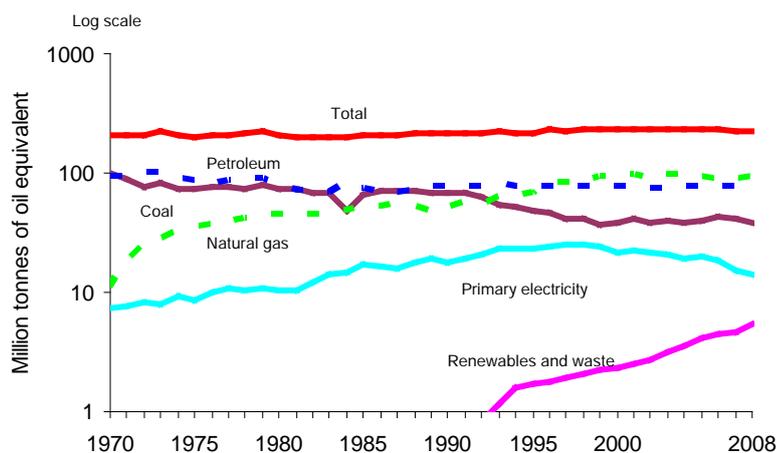
Energy

Inland consumption of primary fuels (Table 1.1.1)

1.1.1 The trends for inland consumption of primary fuels for energy use are illustrated below in Chart 1.1.1. Overall consumption for energy use increased steadily up to 1973, when the oil price rise following the Arab-Israeli war of that year led to a major change in patterns of fuel consumption. Having reached a level of over 220 million tonnes of oil equivalent in 1973, energy use fell, but by 1979 had returned to a similar level to that in 1973. After the outbreak of another Middle East war, consumption fell back to less than 200 million tonnes of oil equivalent in the years 1981 to 1984. It has since grown again, and by 1996 had exceeded the peak levels of 1973 and 1979. In 2005 it had grown to 234.7 million tonnes, but has since fallen back by 4.4 per cent to 224.2 million tonnes in 2008.

1.1.2 The changing trend in overall energy consumption was affected by petroleum consumption, which had continued to grow in the period 1970 to 1973 despite the strong growth in consumption of natural gas and primary electricity, mainly nuclear. After 1973, petroleum consumption declined for ten years, following much the same pattern as coal use. Since 1985 petroleum consumption has not changed a great deal. In 2003 petroleum consumption had fallen to its lowest level since 1987, but consumption has risen since then, peaking in 2005, though it has since fallen back by 3.8 per cent in 2008. Over the same period the general decline in coal consumption has continued, although it reversed in 2006 following increased demand for coal at power stations. Coal consumption has since fallen back by 13 per cent. In 1970 coal accounted for 47 per cent of all fuels consumed. In 1980 this figure had fallen to 36 per cent, in 1990 31 per cent, and in 2008 it had declined to 17 per cent. Natural gas consumption, which accounted for only 5 per cent of all fuels consumed in 1970, grew steadily over this period, and exceeded petroleum consumption for the first time in 1996; by 2004 it accounted for 41 per cent of all fuels consumed. This fell back in 2006 to 38 per cent as the sharp rise in prices in that year resulted in generators switching some gas fired electricity production to coal fired generation. By 2008, its share had risen back to 41 per cent as a number of generators switched back some production from using coal to gas fired stations. Consumption of energy from renewables and waste continued to increase, accounting for 0.3 per cent of all fuels consumed in 1990, but increasing to 2.4 per cent in 2008.

Chart 1.1.1: Inland consumption of primary fuels and equivalents for energy use 1970 to 2008



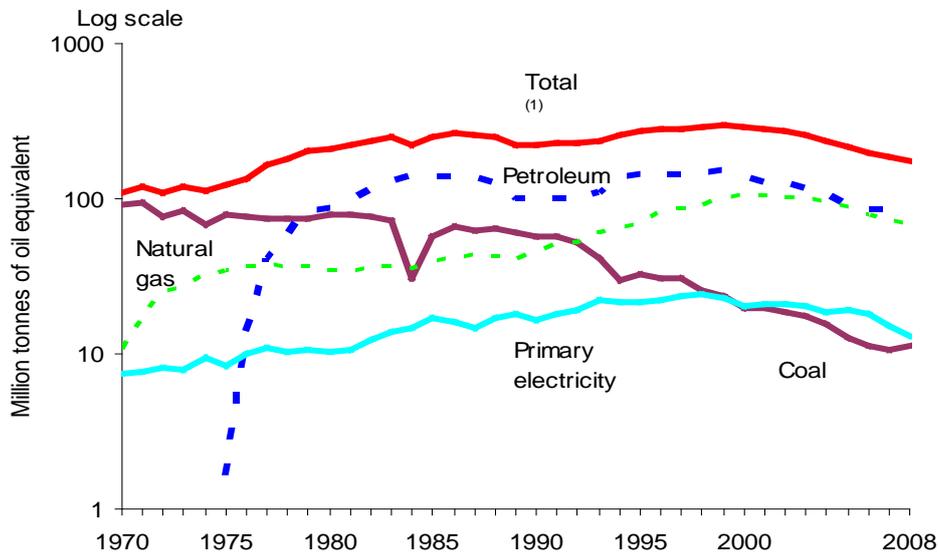
Availability and consumption of primary fuels and equivalents (Table 1.1.2)

1.1.3 An overall view of energy presented in the form of energy balances is given in Table 1.1.2. It is based on Chapter 1, Tables 1.1 to 1.3, of the main Digest with the time series extended back to

1970. Supplies and uses of energy are expressed on an energy-supplied basis in tonnes of oil equivalent, and are balanced by fuel type and for total energy. More details on the derivation of these balances and on the calculation of energy contents are given in Chapter 1, paragraphs 1.28 to 1.29 and Annex A of the main Digest.

1.1.4 Trends in the production of primary fuels in the United Kingdom are illustrated in Chart 1.1.2.

Chart 1.1.2: UK production of primary fuels 1970 to 2008



(1) Includes renewables & waste and heat.

1.1.5 In 1970, total energy production was around 111 million tonnes of oil equivalent with coal accounting for some 84 per cent. From 1975, petroleum production also grew rapidly to peak at over 139 million tonnes of oil equivalent in 1985 when it accounted for 55 per cent of the total energy production of 252.5 million tonnes of oil equivalent. By 1991, temporary production problems had reduced petroleum production to 100 million tonnes of oil equivalent. Since then petroleum production steadily recovered, reaching a record level of 150 million tonnes of oil equivalent in 1999. Between 1999 and 2006 production of petroleum fell by 44 per cent. Production levels stabilised in 2007 as output from new fields (Buzzard) offset the general decline in production. In 2007, petroleum production represented 45 per cent of total energy production. However, output fell by 6 per cent in 2008 to leave it down 48 per cent from its peak in 1999. Natural gas from the North Sea started to be produced in substantial quantities from the early 1970s, accounting for 9 per cent of total production in 1970, and grew steadily to peak at 108.4 million tonnes in 2000. Since then natural gas production has eased and by 2008 had fallen by 36 per cent from this peak. In 2008 gas accounted for 39 per cent of total energy production. In 1970 coal accounted for 84 per cent of total energy production. In 1980, with the increase in petroleum and natural gas production, coal production fell to 37 per cent of total energy production, falling further to 7 per cent in 1990. In 2008, coal accounted for 6 per cent of total energy production. Primary electricity (nuclear, wind and hydro) together accounted for 7 per cent in 2008, down from 9 per cent in 2006 as nuclear output fell due to closures and outages.

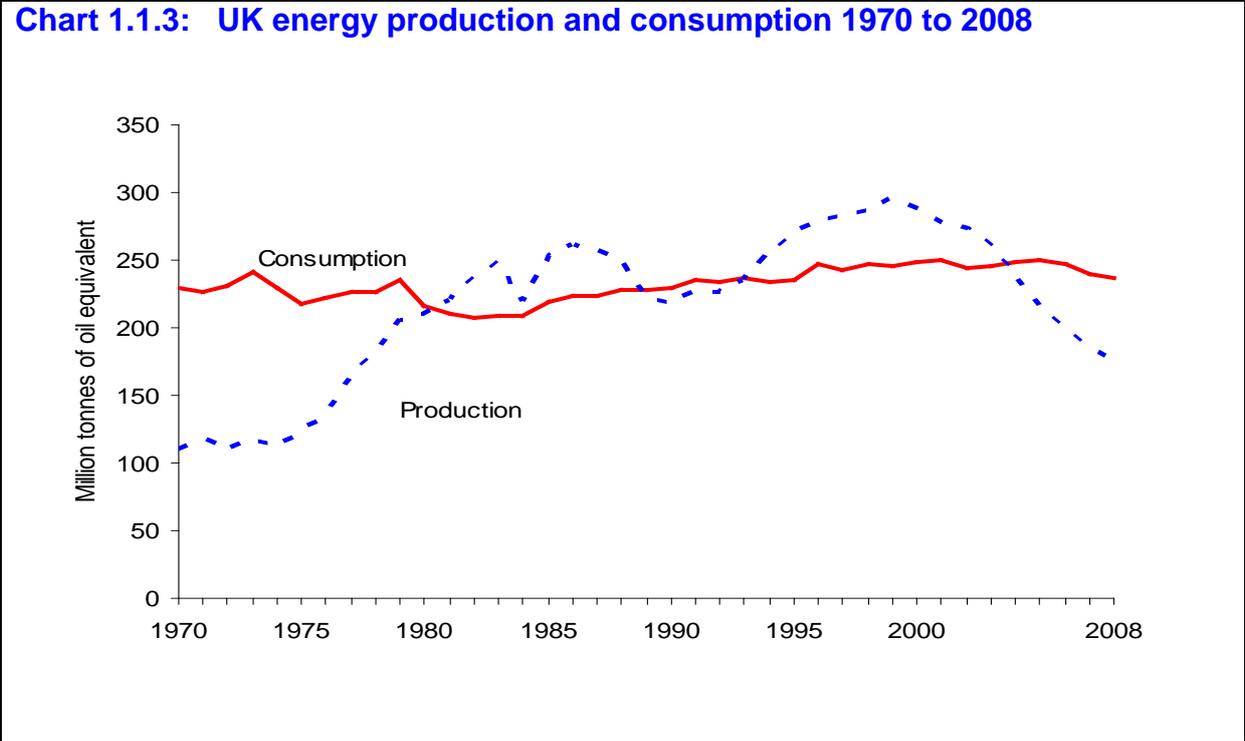
Comparison of net imports of fuel with total consumption of primary fuels and equivalents (Table 1.1.3)

1.1.6 In Table 1.1.3 gross fuel consumption in the United Kingdom, including non-energy use and international marine bunkers, is compared with net imports of fuel to show net import dependency or net export ratio.

1.1.7 Chart 1.1.3 shows United Kingdom primary energy production and consumption (from Tables 1.1.2 and 1.1.3) and illustrates the degree to which the United Kingdom was dependent on energy

imports prior to North Sea oil and gas becoming available. In the early 1970s energy imports accounted for over 50 per cent of United Kingdom consumption, but by 1983 the United Kingdom was a net exporter at a level equivalent to 18 per cent of inland consumption, following the growth in output from the North Sea. After 1986 net exports declined. Following temporary production losses in the North Sea, the United Kingdom became a small net importer of energy between 1989 and 1992. Between 1993 and 2003 the United Kingdom became a net exporter again with a new peak of 21 per cent in 1999. However, in 2004 the United Kingdom became a net importer again at a level of 4.5 per cent of inland consumption. This increased to 26.2 per cent in 2008, the highest level since 1976.

Chart 1.1.3: UK energy production and consumption 1970 to 2008



Energy ratio (Table 1.1.4)

1.1.8 The relationship between energy consumption and economic activity at the aggregate level can be gauged by comparing a country’s temperature corrected inland primary energy consumption with its gross domestic product (GDP). This approach is simple and comprehensive but it has a number of drawbacks which were discussed in articles in the August 1976, May 1981 and May 1989 issues of *Economic Trends* (The Stationery Office).

1.1.9 The temperature corrected series of total inland fuel consumption given in Table 1.1.4 indicates what annual consumption might have been if the average temperature during the year had been the same as the average for the years 1971 to 2000. This average is given, with annual deviations, in Table 1.1.7 whilst Table 1.1.8 shows average temperatures for each month from 1970. The corrections used to increase demand per degree Celsius above average are:

- Coal 2.1 per cent
- Petroleum 0.7 per cent (June - August)
- 1.8 per cent (September - May)

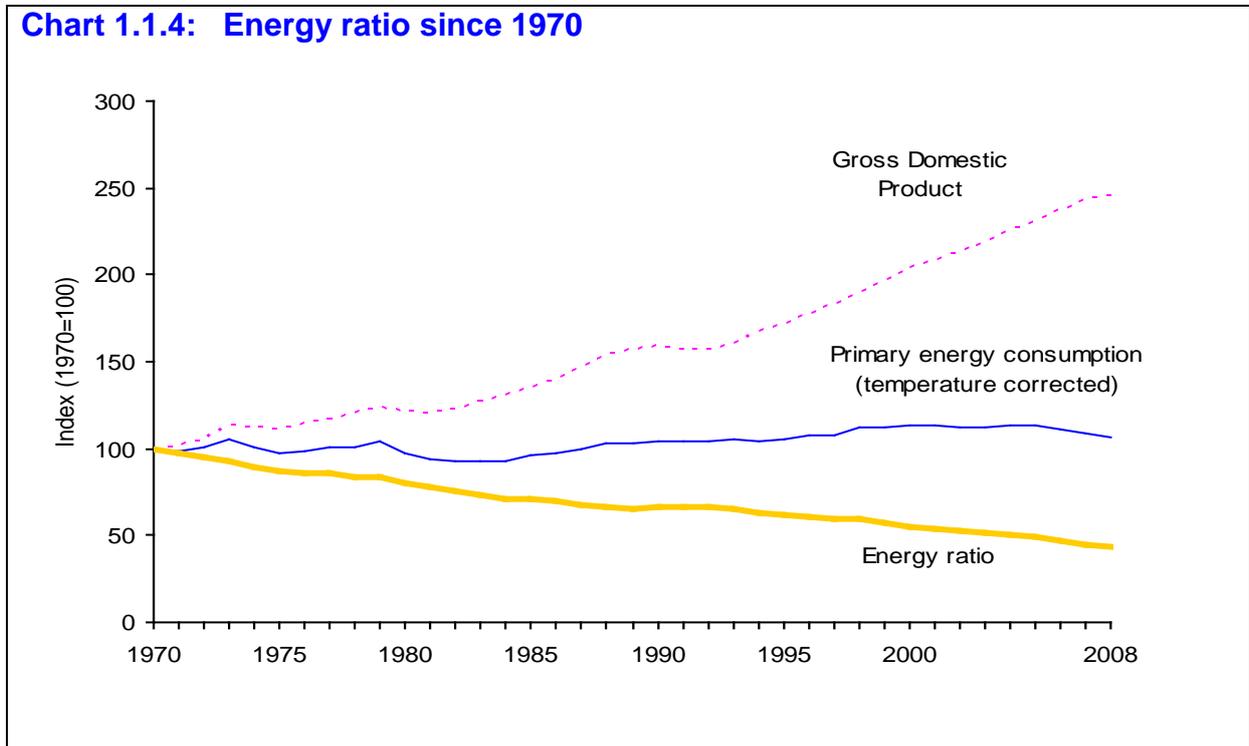
1.1.10 Figures for natural gas from 1990 onwards are corrected using a method developed by Transco (now part of National Grid). Prior to 1990, the annual temperature adjustment applied by the DTI differed from that applied by British Gas due to the effect of seasonal adjustment of the monthly data. Nuclear, hydro, wind and net imports of electricity are not corrected for temperature.

1.1.11 Table 1.1.4 shows the United Kingdom’s temperature corrected inland primary energy consumption in column A and GDP at constant prices since 1970 (column B), both expressed in absolute units (millions of tonnes of oil equivalent and billions of pounds sterling at 2005 prices

respectively). Dividing energy consumption by GDP yields the energy ratio, which is expressed in column C of the table as energy consumed per million pound of GDP and in column D as an index number based on 1970=100. For GDP at constant prices the published measure of GDP at market prices at 2005 prices has been used. The GDP figures used are on the European System of Accounts (ESA 95) basis, consistent with the UK national accounts.

1.1.12 Chart 1.1.4 illustrates trends in primary energy consumption, GDP and the energy ratio over the period 1970 to 2008.

Chart 1.1.4: Energy ratio since 1970



1.1.13 Chart 1.1.4 shows that energy ratio fell steadily (with the exception of 1990 and 1991) from its 1970 level to 43 per cent of that level by 2008, an average decrease of around 2 per cent per annum. The strong downward trend since 1970 is explained by at least four factors: improvements in energy efficiency; saturation in the ownership levels of the main domestic appliances; the unresponsiveness of certain industrial uses, like space heating, to long run output growth; and a structural shift away from energy intensive activities (such as steel making) towards low energy industries (such as services).

Energy consumption by final user (Table 1.1.5)

1.1.14 Figures for energy consumption (excluding non-energy use) by category of final users are given in Table 1.1.5. Final users' consumption is net of the fuel industries' own use and conversion, transmission and distribution losses, but it includes conversion losses by final users. The user categories are industry (including iron and steel), transport (including coastal shipping), domestic and other final users (public administration, agriculture, commerce and other sectors), see Chapter 1, paragraphs 1.54 to 1.58 of the main Digest.

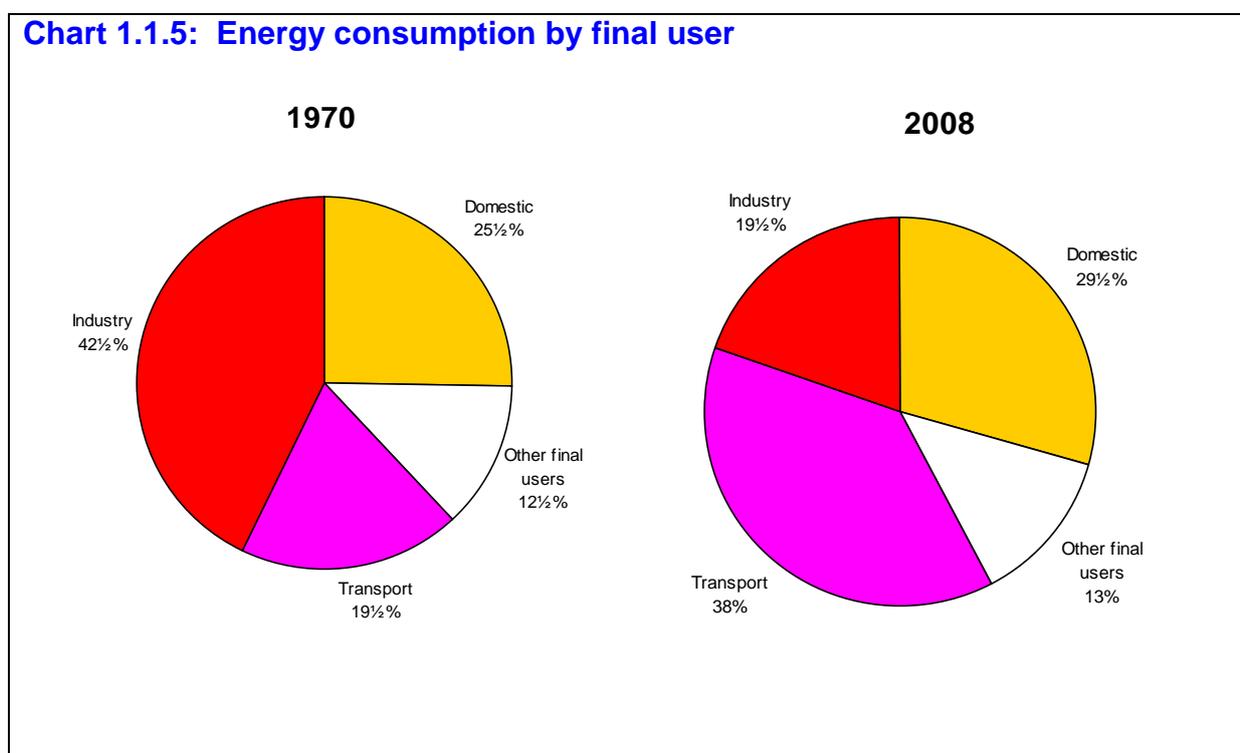
1.1.15 Up to 1986, data for final consumption of electricity include acquisitions from public supply, output of industrial nuclear stations, and amounts produced by transport undertakings and industrial hydropower for final consumption. From 1987 onwards, all consumption of electricity, whether produced by major power producers or by other generators, are included. There is a corresponding change in treatment, between 1986 and 1987, for other fuels used in electricity generation (see Chapter 1, paragraph 1.34 of the main Digest).

1.1.16 Overall consumption by final users has followed the same pattern as overall primary energy consumption since 1970, accounting for around 70 per cent of the total consumption throughout the period.

1.1.17 In 1970, the industry sector (including iron and steel) had the greatest level of consumption, with 43 per cent of total final consumption. However, since 1970 this sector has steadily reduced its consumption, falling to 34 per cent in 1980 and 26 per cent of total final consumption in 1990. It now stands at 20 per cent of total final consumption for energy use. This share is now less than that of the domestic sector which, at 29 per cent, has retained around the same share since 1980. The greatest growth has been in the transport sector; this had a share of 19 per cent in 1970, before growing to 25 per cent in 1980, 33 per cent in 1990 and 38 per cent in 2008. Service sector consumption has remained steady from 1970 to 2008 and was 13 per cent of total final consumption in 2008.

1.1.18 A comparison of energy consumption for energy purposes by final users in 1970 and 2008 is shown in Chart 1.1.5.

Chart 1.1.5: Energy consumption by final user



1.1.19 Table 1.1.5 also shows trends in final energy consumption for individual fuels. In 1970, consumption of coal and other solid fuels accounted for 31 per cent of final energy consumption, but this share has declined steadily to around 2 per cent in 2008. Over this period consumption of natural gas has increased rapidly, up from 3 per cent in 1970 to stand at 33 per cent in 2008. Electricity consumption has made steady progress over the last three decades, rising from 11 per cent of the total in 1970 to 19 per cent in 2008. Petroleum's share has remained broadly steady, with a 47 per cent share in 1970 falling back to 40 per cent in 1985, though this has since risen to 44 per cent in 2008. A comparison of final energy consumption for individual fuels in 1970 and 2008 is shown in Chart 1.1.6.

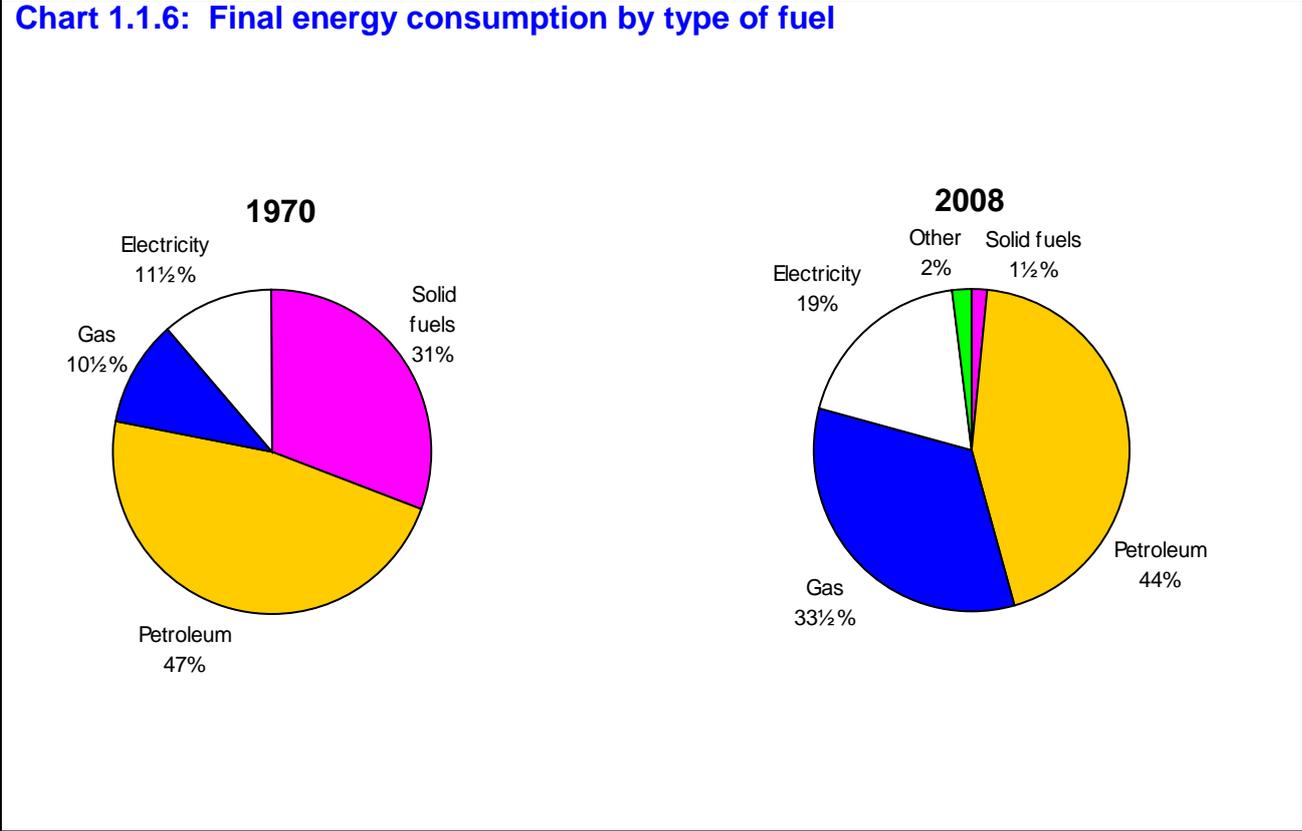
Expenditure on energy by final user (Table 1.1.6)

1.1.20 Total expenditure on fuels is presented in Table 1.1.6 from 1970, and figures for recent years are illustrated in Chapter 1, Chart 1.4 of the main Digest. Data for the latest years are taken from the value balances (Chapter 1, Tables 1.4 to 1.6 of the main Digest) whilst earlier years are taken from their forerunner tables of estimated values of energy purchases by sector. The total fuels series is simply the sum of fuels presented in the table and so is slightly different from the value presented in the value balances as other fuels and heat sold (which accounted for around 0.3 per cent of total final

expenditure in 2006) are excluded but coal purchased by the iron and steel sector is included as a final purchase of coal.

1.1.21 Overall final expenditure on energy rose by around £22,000 million (22 per cent) in 2008 compared to 2007, as prices of all fuels rose sharply. The level of £121,370 million represents a 110 per cent rise on 1998 and 163 per cent more than in 1990. The final expenditure for all fuels rose sharply, with spending on electricity up by 18 per cent, for petroleum products up by 23 per cent, and with spending on gas up by 26 per cent.

Chart 1.1.6: Final energy consumption by type of fuel



1.1.22 The make up of total expenditure has changed through time, reflecting structural or long term changes in fuel mix and shorter term price and consumption effects. In 1970, expenditure on coal and coke accounted for around 15 per cent of total final expenditure, but was down to 1 per cent in 2008. By contrast, the general increase in the consumer price of petroleum (where duty is a major component) has meant that petroleum rose from 45 per cent of all expenditure in 1970 to 63 per cent in 2004, though this percentage has declined to 59 per cent due to the rises in gas and electricity prices since 2004.

Mean air temperatures (Tables 1.1.7 and 1.1.8)

1.1.23 These tables give the average air temperatures in Great Britain between 1971 and 2000 by year, part year and month. Deviations from these means are presented for January 2000 to December 2008. Average monthly temperatures back to 1970 are also given in Table 1.1.8. These temperature deviations are used to provide the temperature corrected consumption series shown in Table 1.1.4. The daily average temperature for 2008 was 0.3 degrees higher than the long term mean covering 1971 to 2000, though 2008 was the coldest year since 1996.

1.1.1 Inland consumption of primary fuels and equivalents for energy use, 1970 to 2008

		1970	1971	1972	1973	1974
In original units of measurement						
	Unit					
Coal (1)	M.tonnes	156.9	139.3	122.4	133.0	117.9
Petroleum (2)	"	87.0	88.0	94.2	95.3	88.5
Natural gas (3)	GWh	131,472	212,037	300,808	325,455	389,286
Nuclear electricity (4)	"	26,039	27,418	29,275	27,757	33,377
Hydro electricity (4)(5)	"	4,539	3,397	3,429	3,874	4,095
Million tonnes of oil equivalent						
Coal (1)		99.0	87.7	76.8	83.2	73.3
Petroleum (2)		92.4	93.5	100.2	101.5	94.3
Natural gas (3)		11.3	18.2	25.9	28.0	33.5
Nuclear electricity (4)		7.0	7.4	7.9	7.5	9.0
Hydro electricity (5)		0.4	0.3	0.3	0.3	0.4
Total		210.1	207.1	211.0	220.5	210.4
Percentage shares (energy supplied basis)						
Coal		47.1	42.3	36.4	37.7	34.8
Petroleum		44.0	45.2	47.5	46.0	44.8
Natural gas		5.4	8.8	12.3	12.7	15.9
Nuclear electricity		3.3	3.6	3.7	3.4	4.3
Hydro electricity		0.2	0.1	0.1	0.2	0.2
In original units of measurement						
	Unit					
Coal (1)	M.tonnes	120.0	122.0	122.7	119.9	129.6
Petroleum (2)	"	79.4	77.8	79.3	81.2	81.6
Natural gas (3)	GWh	407,750	432,661	459,858	477,002	521,197
Nuclear electricity (4)	"	30,215	35,570	39,575	37,065	38,062
Hydro electricity (4)(5)	"	3,789	4,552	3,919	4,038	4,289
Million tonnes of oil equivalent						
Coal (1)		73.7	75.0	75.3	73.3	78.8
Petroleum (2)		85.0	83.5	85.1	87.2	87.7
Natural gas (3)		35.1	37.2	39.5	41.0	44.8
Nuclear electricity (4)		8.1	9.6	10.6	10.0	10.2
Hydro electricity (5)		0.3	0.4	0.3	0.3	0.4
Total		202.2	205.6	210.9	211.8	221.9
Percentage shares (energy supplied basis)						
Coal		36.5	36.5	35.7	34.6	35.5
Petroleum		42.0	40.6	40.4	41.2	39.5
Natural gas		17.3	18.1	18.7	19.4	20.2
Nuclear electricity		4.0	4.6	5.0	4.7	4.6
Hydro electricity		0.2	0.2	0.2	0.2	0.2

1.1.1 Inland consumption of primary fuels and equivalents for energy use, 1970 to 2008 (continued)

		1980	1981	1982	1983	1984
In original units of measurement						
	Unit					
Coal (1)	M.tonnes	120.8	118.2	110.7	111.5	79.0
Petroleum (2)	"	70.5	64.2	65.2	61.7	78.6
Natural gas (3)	GWh	521,051	528,114	525,476	547,750	560,410
Nuclear electricity (4)	"	36,870	37,897	44,212	50,138	53,957
Hydro electricity (4)(5)	"	3,934	4,383	4,558	4,563	4,005
Million tonnes of oil equivalent						
Coal (1)		73.3	72.9	68.0	68.6	48.7
Petroleum (2)		76.2	69.5	70.7	67.2	84.7
Natural gas (3)		44.8	45.4	45.2	47.1	48.2
Nuclear electricity (4)		9.9	10.2	11.9	13.5	14.5
Hydro electricity (4)(5)		0.3	0.4	0.4	0.4	0.3
Total (6)		204.5	198.4	196.1	196.8	196.4
Percentage shares (energy supplied basis)						
Coal		35.8	36.7	34.7	34.9	24.8
Petroleum		37.3	35.0	36.0	34.2	43.1
Natural gas		21.9	22.9	23.0	23.9	24.5
Nuclear electricity		4.8	5.1	6.1	6.8	7.4
Hydro electricity		0.2	0.2	0.2	0.2	0.2
		1985	1986	1987	1988	1989
In original units of measurement						
	Unit					
Coal (1)	M.tonnes	105.3	113.5	116.2	112.0	108.1
Petroleum (2)	"	66.5	65.3	63.5	67.8	69.0
Natural gas (3)	GWh	602,701	612,724	629,311	597,220	571,187
Nuclear electricity (4)	"	61,391	59,079	55,238	63,456	71,734
Hydro electricity (4)(5)	"	4,093	4,780	4,198	4,919	4,758
Net electricity imports	"	..	4,255	11,635	12,830	12,631
Million tonnes of oil equivalent						
Coal (1)		64.8	70.0	71.7	70.0	67.0
Petroleum (2)		72.2	71.1	69.4	74.0	75.4
Natural gas (3)		51.8	52.7	54.1	51.4	49.1
Nuclear electricity (4)		16.5	15.4	14.4	16.6	17.7
Hydro electricity (4)(5)		0.4	0.4	0.4	0.4	0.4
Net electricity imports		..	0.4	1.0	1.1	1.1
Renewables & waste		..	..	..	..	0.7
Total (6)		205.7	210.0	211.0	213.5	211.4
Percentage shares (energy supplied basis)						
Coal		31.5	33.3	34.0	32.8	31.7
Petroleum		35.1	33.9	32.9	34.7	35.7
Natural gas		25.2	25.1	25.6	24.1	23.2
Nuclear electricity		8.0	7.4	6.8	7.8	8.4
Hydro electricity		0.2	0.2	0.2	0.2	0.2
Net electricity imports		..	0.2	0.5	0.5	0.5
Renewables & waste		..	..	..	..	0.3

1.1.1 Inland consumption of primary fuels and equivalents for energy use, 1970 to 2008 (continued)

		1990	1991	1992	1993	1994
In original units of measurement						
	Unit					
Coal (1)	M.tonnes	108.4	107.6	101.1	87.4	82.1
Petroleum (2)	"	70.6	70.6	70.9	71.5	70.0
Natural gas (3)	GWh	595,131	643,863	640,459	732,090	754,284
Nuclear electricity (4)	"	65,749	70,543	76,807	76,807	89,353
Hydro electricity (4)(5)	"	5,216	4,635	5,465	5,465	4,521
Net electricity imports	"	11,943	16,408	16,694	16,716	16,887
Million tonnes of oil equivalent						
Coal (1)		66.9	67.1	63.0	55.0	51.3
Petroleum (2)		77.2	77.1	77.5	78.1	76.7
Natural gas (3)		51.2	55.4	55.1	62.9	64.9
Nuclear electricity		16.3	17.4	18.5	21.6	21.2
Hydro electricity (5)		0.4	0.4	0.5	0.5	0.4
Net electricity imports		1.0	1.4	1.4	1.4	1.5
Renewables & waste		0.7	0.7	0.8	1.2	1.6
Total (6)		213.6	219.5	216.7	220.7	217.5
Percentage shares (energy supplied basis)						
Coal		31.3	30.6	29.1	24.9	23.6
Petroleum		36.1	35.1	35.8	35.4	35.3
Natural gas		24.0	25.2	25.4	28.5	29.8
Nuclear electricity		7.6	7.9	8.5	9.8	9.7
Hydro electricity		0.2	0.2	0.2	0.2	0.2
Net electricity imports		0.5	0.6	0.7	0.7	0.7
Renewables & waste		0.3	0.3	0.4	0.5	0.7
		1995	1996	1997	1998	1999
In original units of measurement						
	Unit					
Coal (1)	M.tonnes	77.2	72.1	63.5	63.6	56.5
Petroleum (2)	"	68.9	71.3	68.7	69.1	68.4
Natural gas (3)	GWh	805,058	941,841	971,503	1,010,191	1,075,203
Nuclear electricity (4)	"	88,282	94,671	98,146	99,486	95,133
Hydro electricity (4)(5)	"	5,438	3,879	4,836	5,994	6,187
Net electricity imports	"	16,313	16,755	16,574	12,468	14,244
Million tonnes of oil equivalent						
Coal (1)		48.9	45.7	40.8	40.9	36.7
Petroleum (2)		75.4	77.8	75.5	76.0	75.2
Natural gas (3)		69.2	81.0	83.5	86.9	92.5
Nuclear electricity		21.3	22.1	23.1	23.4	22.4
Hydro electricity (5)		0.5	0.3	0.4	0.5	0.5
Net electricity imports		1.4	1.4	1.4	1.1	1.2
Renewables & waste		1.7	1.8	1.9	2.1	2.2
Total (6)		218.4	230.0	226.8	230.8	230.7
Percentage shares (energy supplied basis)						
Coal		22.4	19.9	18.0	17.7	15.9
Petroleum		34.5	33.8	33.3	33.0	32.6
Natural gas		31.7	35.2	36.8	37.6	40.1
Nuclear electricity		9.7	9.6	10.2	10.2	9.7
Hydro electricity		0.2	0.1	0.2	0.2	0.2
Net electricity imports		0.6	0.6	0.6	0.5	0.5
Renewables & waste		0.8	0.8	0.8	0.9	1.0

1.1.1 Inland consumption of primary fuels and equivalents for energy use, 1970 to 2008 (continued)

		2000	2001	2002	2003	2004
In original units of measurement						
	Unit					
Coal (1)	M.tonnes	60.1	63.9	59.0	63.7	61.3
Petroleum (2)	"	69.1	68.8	67.3	66.8	68.5
Natural gas (3)	GWh	1,112,124	1,109,284	1,095,254	1,099,053	1,123,220
Nuclear electricity (4)	"	85,063	90,093	87,848	88,686	79,999
Hydro electricity (4)(5)	"	6,032	5,020	6,047	4,516	6,783
Net electricity imports	"	14,174	10,399	8,414	2,160	7,490
Million tonnes of oil equivalent						
Coal (1)		38.6	41.0	37.7	40.5	39.0
Petroleum (2)		75.9	75.4	74.0	73.5	75.3
Natural gas (3)		95.6	95.4	94.2	94.5	96.6
Nuclear electricity		19.6	20.8	20.1	20.0	18.2
Hydro electricity (5)		0.5	0.4	0.5	0.4	0.6
Net electricity imports		1.2	0.9	0.7	0.2	0.6
Renewables & waste		2.3	2.5	2.8	3.1	3.5
Total (6)		233.7	236.3	229.9	232.0	233.5
Percentage shares (energy supplied basis)						
Coal		16.5	17.3	16.4	17.5	16.7
Petroleum		32.5	31.9	32.2	31.7	32.2
Natural gas		40.9	40.4	41.0	40.7	41.4
Nuclear electricity		8.4	8.8	8.7	8.6	7.8
Hydro electricity		0.2	0.2	0.2	0.2	0.2
Net electricity imports		0.5	0.4	0.3	0.1	0.3
Renewables & waste		1.0	1.1	1.2	1.3	1.5
		2005	2006	2007	2008	
In original units of measurement						
	Unit					
Coal (1)	M.tonnes	62.5	68.1	63.7r	58.9	
Petroleum (2)	"	70.4	70.1	68.9r	76.2	
Natural gas (3)	GWh	1,091,627	1,037,585r	1,047,985r	1,081,432	
Nuclear electricity (4)	"	81,618	75,451	63,028	52,486	
Hydro electricity (4)(5)	"	7,834	8,829	10,376r	12,282	
Net electricity imports	"	8,321	7,517	5,215	11,022	
Million tonnes of oil equivalent						
Coal (1)		39.8	43.5r	40.9r	37.9	
Petroleum (2)		77.3	77.1	75.6	74.4	
Natural gas (3)		93.9	89.2r	90.1r	93.0	
Nuclear electricity		18.4	17.1	14.0	11.9	
Hydro electricity (5)		0.7	0.8	0.9	1.1	
Net electricity imports		0.7	0.6	0.4	0.9	
Renewables & waste		4.1	4.4r	4.7r	5.3	
Total (6)		234.7	232.6r	226.6r	224.4	
Percentage shares (energy supplied basis)						
Coal		17.0	18.7	18.0r	16.9	
Petroleum		33.0	33.1r	33.4	33.2	
Natural gas		40.0	38.4	39.8r	41.4	
Nuclear electricity		7.8	7.4	6.2	5.3	
Hydro electricity		0.3	0.3	0.4	0.5	
Net electricity imports		0.3	0.3	0.2	0.4	
Renewables & waste		1.7	1.9r	2.1r	2.4	

(1) Includes other solid fuels.

(2) Excludes petroleum for non-energy use and marine bunkers.

(3) Includes colliery methane, non-energy use of natural gas up to 1988.

(4) Electricity generated i.e. including own use.

(5) Excludes pumped storage. Includes generation at wind stations from 1988.

(6) Following the introduction of the energy balance presentation it has been possible to separately identify the losses from the statistical difference for gas and electricity, bringing them onto the same basis as other fuels. This has been accounted for in the total from 1994 onwards.

1.1.2 Availability and consumption of primary fuels and equivalents (energy supplied basis) 1970 to 2008

Thousand tonnes of oil equivalent

	Available supply												
	Production					Imports					Exports		
	Coal	Petroleum	Natural gas	Primary electricity	Total	Coal	Petroleum	Natural gas	Electricity	Total	Coal	Petroleum	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
1970	92,792	166	10,461	7,388	110,807	81	131,142	839	48	132,109	2,620	19,762	22,381
1971	94,178	227	17,384	7,661	119,450	2,887	136,359	836	10	140,092	2,048	20,024	22,071
1972	76,484	358	25,084	8,163	110,089	3,408	138,253	771	40	142,472	1,433	21,160	22,593
1973	82,636	400	27,235	7,793	118,064	1,214	144,117	738	5	146,074	2,131	22,026	24,157
1974	68,630	438	32,847	9,322	111,237	2,317	136,472	612	5	139,407	2,149	17,283	19,432
1975	79,172	1,675	34,203	8,446	123,496	3,209	111,703	844	8	115,763	1,975	16,517	18,492
1976	75,988	13,114	36,221	9,951	135,274	2,010	108,818	967	-	111,796	1,506	21,671	23,177
1977	74,769	41,186	37,845	10,973	164,773	1,761	90,004	1,680	-	93,445	1,753	33,112	34,865
1978	75,479	58,184	36,241	10,308	180,212	1,736	85,815	4,758	-	92,309	2,164	41,289	43,460
1979	74,028	83,966	36,596	10,598	205,188	3,169	77,903	8,323	-	89,394	2,025	57,607	59,632
1980	78,502	86,911	34,790	10,247	210,450	5,030	60,385	9,995	-	75,411	3,320	58,385	61,705
1981	78,008	96,941	34,712	10,562	220,223	3,192	50,040	10,681	-	63,912	6,884	69,615	76,500
1982	76,069	112,519	35,281	12,274	236,143	3,360	49,944	9,885	-	63,189	5,693	80,595	86,288
1983	72,696	125,482	36,379	13,866	248,423	3,713	43,543	10,701	-	57,957	4,844	90,608	95,452
1984	30,719	137,646	35,563	14,845	218,773	7,980	59,146	12,606	-	79,731	1,668	101,289	102,957
1985	56,572	139,404	39,679	16,851	252,506	9,482	52,577	12,645	-	74,703	2,441	106,602	109,043
1986	65,592	139,084	41,717	15,839	262,232	7,794	57,610	11,784	366	77,553	2,615	112,166	114,796
1987	63,189	135,071	43,674	14,797	256,731	7,363	54,305	11,079	1,000	73,746	1,872	107,108	108,980
1988	63,303	125,469	42,059	16,990	248,469	9,270	58,254	9,922	1,103	78,550	1,595	97,266	98,861
1989	60,882	100,373	41,188	18,150	221,320	8,840	64,153	9,784	1,163	83,941	1,738	74,434	76,249
1990	56,443	100,104	45,480	16,706	219,446	10,271	69,217	6,866	1,031	87,385	1,880	80,408	82,293
1991	57,555	99,890	50,638	17,830	226,669	13,493	72,942	6,193	1,412	94,040	1,526	81,105	82,632
1992	51,514	103,734	51,494	18,924	226,547	13,955	74,025	5,268	1,438	94,686	854	85,245	86,155
1993	41,588	109,613	60,542	21,969	234,882	13,103	77,612	4,173	1,438	96,326	954	95,312	96,854
1994	29,704	138,937	64,636	21,670	256,559	10,840	68,680	2,843	1,452	83,815	1,098	114,083	116,003
1995	32,751	142,746	70,807	21,735	269,738	11,615	63,341	1,673	1,405	78,034	889	116,001	117,859
1996	31,135	142,079	84,180	22,393	281,559	13,141	64,347	1,703	1,444	80,635	896	114,909	117,115
1997	30,303	140,443	85,887	23,535	282,082	14,400	63,813	1,209	1,429	80,850	1,061	115,815	118,743
1998	25,757	145,263	90,186	23,950	287,233	15,371	64,696	910	1,083	82,061	931	118,896	122,556
1999	23,219	150,160	99,109	22,942	297,655	14,039	64,085	1,106	1,247	80,476	774	123,920	131,976
2000	19,551	138,282	108,397	20,153	288,690	16,079	74,812	2,238	1,230	94,359	813	123,923	137,330
2001	19,969	127,828	105,870	21,227	277,426	23,565	77,235	2,619	917	104,337	679	115,680	128,277
2002	18,808	127,037	103,646	20,619	272,864	18,995	78,348	5,201	790	103,334	667	120,758	134,451
2003	17,636	116,242	102,926	20,428	260,240	21,396	77,062	7,420	440	106,430	530	107,201	123,208
2004	15,594	104,547	96,411	18,746	238,378	24,182	88,394	11,439	841	125,258	572	103,621	114,202
2005	12,714	92,883	88,219	19,044	216,534	29,157	88,832	14,904	960	134,273	509	91,498	100,521
2006	11,418r	83,958	80,012	17,889	197,232r	33,363	94,207	20,983	884	149,933	462	86,349	97,418
2007	10,696r	83,912r	72,125	14,928	186,017r	28,930r	90,111r	29,065	741	149,225r	589r	88,464r	99,935r
2008	11,362	78,580	69,672	12,965	176,939	28,918	91,683	35,000	1,057	157,606	599	84,325	95,581

(1) Crude oil plus all condensates and petroleum gases extracted at gas separation plants.

(2) Includes colliery methane.

(3) Nuclear and natural flow hydro electricity excluding generation of pumped storage stations. From 1988 includes generation at wind stations.

(4) Includes solar and geothermal heat, solid renewable sources (wood, waste, etc), and gaseous renewable sources (landfill gas, sewage gas) from 1988.

(5) Includes other solid fuels.

(6) Crude and process oils and petroleum products.

(7) Includes exports of natural gas and electricity.

1.1.2 Availability and consumption of primary fuels and equivalents (energy supplied basis) 1970 to 2008 (continued)

Thousand tonnes of oil equivalent

	Marine		Statistical					Gross		Inland consumption for energy use				
	Bunkers	Stock changes (8)		Difference (9)			inland consumption	Non-energy use					Total	
	Petroleum	Coal	Petroleum	Natural gas	Coal	Petroleum			Coal	Petroleum	Natural gas	Primary electricity		
(5)	(6)	(5)	(6)	(13)	(14)	(10)	(5)	(6)	(2)/(11)	(3)/(12)	(4)			
1970	+5,721	+8,542	-680	..	+199	+466	+665	223,341	10,859	98,994	92,366	11,300	7,435	210,095
1971	+5,874	-7,046	-3,489	..	-239	-652	-891	220,170	10,839	87,732	93,543	18,220	7,672	207,167
1972	+5,265	-1,370	+2,904	..	-242	-887	-1,129	225,109	11,474	76,847	100,212	25,855	8,203	211,117
1973	+5,769	+1,456	+458	..	+60	-340	-280	235,847	12,635	83,235	101,501	27,974	7,797	220,507
1974	+4,922	+4,839	-5,139	..	-360	-514	-874	225,116	12,865	73,278	94,327	33,460	9,326	210,391
1975	+3,572	-6,489	+3,660	..	-202	-395	-597	213,769	10,255	73,716	84,963	35,060	8,453	202,192
1976	+3,698	-1,597	-348	..	+121	-254	-133	218,116	10,925	75,016	83,480	37,188	9,951	205,635
1977	+2,942	+600	+2,466	..	-113	-557	-670	222,806	10,517	75,263	85,110	39,526	10,973	210,872
1978	+2,733	-1,368	-814	..	-363	-569	-932	223,214	10,245	73,321	87,177	40,999	10,301	211,798
1979	+2,789	+3,600	-2,229	..	+43	-806	-763	232,768	10,232	78,814	87,681	44,919	10,597	222,011
1980	+2,562	-6,789	+40	..	-171	-1,567	-1,738	213,118	7,464	73,263	76,197	44,785	10,247	204,492
1981	+2,156	-2,013	+3,882	..	+562	-154	+408	207,756	8,111	72,865	69,539	45,392	10,564	198,360
1982	+2,715	-5,660	+2,305	..	-118	-2,315	-2,433	204,540	8,134	67,958	70,671	45,166	12,274	196,069
1983	+2,118	-3,209	+1,010	..	+234	-544	-310	206,290	8,625	68,590	67,228	47,080	13,866	196,764
1984	+2,370	+11,842	+922	..	-136	+247	+111	206,052	8,847	48,738	84,651	48,168	14,845	196,402
1985	+2,239	+1,461	+297	-521	-249	-731	-980	216,184	9,230	64,824	72,179	51,803	16,851	205,657
1986	+2,212	-1,889	+338	-836	+1,126	-83	+1,043	221,432	10,247	70,008	71,148	52,665	16,189	210,010
1987	+1,756	+3,396	+338	-662	-355	-146	-501	222,311	10,290	71,721	69,431	54,090	15,796	211,038
1988	+1,932	-1,547	+1,272	-637	+189	-111	+78	225,392	10,970	69,621	74,042	51,352	18,083	213,098
1989	+2,525	-1,787	-628	-281	+817	+159	+976	224,767	12,039	67,014	75,399	49,113	19,236	211,433
1990	+2,666	+891	+1,049	+108	+1,229	+990	+2,219	226,139	11,252	66,954	77,159	51,187	17,733	213,687
1991	+2,618	-3,402	-851	-273	+947	+448	+1,395	232,330	12,184	67,067	77,137	55,362	19,240	219,505
1992	+2,688	-2,439	+709	-348	+884	-647	+237	230,549	12,890	63,060	77,492	55,080	20,359	216,815
1993	+2,618	+766	-631	+84	+411	+1,597	+2,008	233,964	13,012	54,913	78,126	62,948	23,406	220,564
1994	+2,451	+11,055	+454	+233	+772	-1,668	-87	231,956	13,521	51,272	76,668	64,857	23,087	217,491
1995	+2,602	+5,088	+1,122	+820	+820	-426	+1,752	232,458	13,735	48,924	75,421	69,236	23,116	218,421
1996	+2,813	+2,521	-315	-236	+165	-1,814	+701	243,535	13,547	45,738	77,819	80,984	23,833	229,988
1997	+3,121	-2,389	+320	-354	+462	-1,784	-1,048	239,694	12,879	40,792	75,483	83,534	24,960	226,814
1998	+3,257	+773	-741	-32	+39	-692	-38	243,518	12,737	40,931	76,049	86,861	25,023	230,780
1999	+2,471	-491	+428	+670	-669	+1,190	+715	243,757	12,963	36,662	75,243	92,451	24,166	230,613
2000	+2,208	+3,723	+807	-952	-79	+783	+1,075	246,015	12,283	38,620	75,937	95,625	21,372	233,732
2001	+2,433	-2,077	-1,333	-57	-196	+486	+569	247,017	10,732	40,973	75,377	95,381	22,121	236,286
2002	+2,044	+564	+1,514	-633	-21	-490	-273	241,422	11,544	37,720	73,970	94,175	21,342	229,878
2003	+1,879	+1,979	+217	+304	-31	-451r	-227r	244,309r	12,285r	40,512	73,468	94,502	20,614	232,024
2004	+2,221	-139	-476	-536	+61r	-227	+106r	245,956r	12,429	39,004r	75,283	96,580	19,390	233,527r
2005	+2,181	-1,503	+742	+114	+24	-297	+207r	247,250r	12,580	39,835	77,327	93,863	19,760	234,670r
2006	+2,486	-960r	-1,308	-553	-104r	-61	+101r	244,296r	11,678r	43,463r	77,085	89,216r	18,536	232,618r
2007	+2,513	+1,840r	+1,946r	+471	+23r	-196r	-7r	237,026r	10,429r	40,854r	75,639r	90,110r	15,376	226,596r
2008	+2,733	-1,996	+268	-265	-171	-195	-201	234,439	10,081	37,855	74,384	92,986	13,913	224,358

(8) Stock fall (+), stock rise (-).

(9) Recorded demand minus supply.

(10) Petroleum products for feedstock for petrochemical plants, industrial and white spirits, lubricants bitumen and wax. Also includes miscellaneous petroleum products mainly for inland consumption but excludes small quantities derived from coal. From 1989 also includes estimated quantities of natural gas used for non-energy purposes. Data for non-energy use of natural gas from 2002 can be found in Chapter 1, Tables 1.1 to 1.3 and Chapter 4, Tables 4.1 and 4.2.

(11) Includes non-energy use of natural gas up to 1988. (See footnote 10).

(12) Includes net imports of electricity.

(13) As of 1994 this total includes the statistical differences for electricity and natural gas.

(14) Equivalent to primary demand as in Chapter 1, Tables 1.1 to 1.3.

1.1.3 Comparison of net imports of fuel with total consumption of primary fuels and equivalents, 1970 to 2008

	Gross inland consumption of primary fuels (1) plus marine bunkers	Net imports (+) /net exports (-) of fuels	Import dependency (2)	Export ratio (3)
	(A) Million tonnes of oil equivalent	(B)	(C) Per cent	(D)
1970	229.1	109.7	47.9	-
1971	226.0	118.0	52.2	-
1972	230.4	119.9	52.0	-
1973	241.6	121.9	50.5	-
1974	230.0	120.0	52.2	-
1975	217.3	97.3	44.8	-
1976	221.8	88.6	40.0	-
1977	225.7	58.6	25.9	-
1978	225.9	48.8	21.6	-
1979	235.6	29.8	12.6	-
1980	215.7	13.7	6.4	-
1981	209.9	-12.6	-	6.0
1982	207.3	-23.1	-	11.1
1983	208.4	-37.5	-	18.0
1984	208.4	-23.2	-	11.1
1985	218.4	-34.3	-	15.7
1986	223.6	-37.2	-	16.7
1987	224.1	-35.2	-	15.7
1988	227.3	-20.3	-	8.9
1989	227.3	7.7	3.4	-
1990	228.8	5.1	2.2	-
1991	234.9	11.4	4.9	-
1992	233.2	8.5	3.7	-
1993	236.6	-0.5	-	0.2
1994	234.4	-32.2	-	13.7
1995	235.1	-39.8	-	16.9
1996	246.3	-36.5	-	14.8
1997	242.8	-37.9	-	15.6
1998	246.8	-40.5	-	16.4
1999	246.0	-51.5	-	20.9
2000	248.2	-43.0	-	17.3
2001	249.5	-23.9	-	9.6
2002	243.5	-31.1	-	12.8
2003	246.2	-16.8	-	6.8
2004	248.2	11.1	4.5	-
2005	249.4	33.8	13.5	-
2006	246.8	52.5	21.3	-
2007	239.5r	49.3r	20.6r	-
2008	237.2	62.0	26.2	-

(1) Includes non-energy use. Equivalent to primary demand plus marine bunkers.

(2) Import dependency (C) = $\frac{\text{Net imports (B)}}{\text{(A)}} \times 100$

(3) Export ratio (D) = $\frac{\text{Net exports (B)}}{\text{(A)}} \times 100$

1.1.4 Primary energy consumption, gross domestic product and the energy ratio⁽¹⁾, 1970 to 2008

	Total inland consumption of primary energy (temperature corrected) (2)	Gross domestic product at market prices (2005 prices) (4)	Energy ratio (3)	
	Million tonnes of oil equivalent (A)	£ billion (B)	Tonnes of oil equivalent per £1 million GDP (C)	Index 1970 = 100 (D)
1970	211.9	544.0	389.5	100.0
1971	209.7	555.4	377.5	96.9
1972	212.6	575.7	369.3	94.8
1973	223.1	617.2	361.5	92.8
1974	212.4	609.1	348.7	89.5
1975	206.0	605.3	340.3	87.4
1976	208.9	621.2	336.3	86.3
1977	213.1	636.0	335.1	86.0
1978	213.7	656.5	325.5	83.6
1979	220.0	674.1	326.4	83.8
1980	206.2	660.1	312.4	80.2
1981	198.7	651.3	305.1	78.3
1982	196.3	665.0	295.2	75.8
1983	197.5	689.1	286.6	73.6
1984	196.7	707.5	278.0	71.4
1985	203.1	732.9	277.1	71.1
1986	206.8	762.4	271.3	69.6
1987	210.0	797.1	263.4	67.6
1988	217.7	837.2	260.0	66.8
1989	217.8	856.3	254.3	65.3
1990	221.6	863.0	256.8	65.9
1991	221.4	851.0	260.2	66.8
1992	220.6	852.3	258.8	66.5
1993	222.5	871.2	255.4	65.6
1994	221.5	908.5	243.8	62.6
1995	223.6	936.2	238.8	61.3
1996	227.1	963.2	235.7	60.5
1997	229.2	995.1	230.3	59.1
1998	236.8	1,031.0	229.7	59.0
1999	238.0	1,066.8	223.1	57.3
2000	239.6r	1,108.5	216.2	55.5
2001	240.5	1,135.8	211.7	54.4
2002	237.3	1,159.6	204.6	52.5
2003	237.5	1,192.2	199.2	51.2
2004	240.2	1,227.4	195.7	50.3
2005	239.6r	1,254.1	191.0	49.0
2006	236.5r	1,289.8	183.4	47.1
2007	231.6r	1,322.8	175.1	45.0
2008	225.3	1,332.7	169.1	43.4

(1) See paragraphs 1.1.8 to 1.1.13.

(2) The methodology used to temperature correct gas consumption has been modified from 1990. See paragraph 1.1.9 onwards.

(3) Energy ratio (C) = (A)

(B)

(4) GDP figures calculated on 2005 prices - 2008 version of this table was calculated on 2003 prices.

1.1.5 Energy consumption by final user (energy supplied basis)⁽¹⁾, 1970 to 2008

Thousand tonnes of oil equivalent

Industry (2)											
	Coal	Coke and breeze (3)	Other solid fuels(4)	Coke oven gas	Town gas	Natural gas (5)	Electricity	Heat sold	Renewables	Petroleum	Total (3)
1970	12,681	9,655	209	1,164	1,778	1,788	6,275	..	..	28,397	62,333
1971	10,232	8,298	176	1,118	1,038	5,194	6,313	..	..	28,130	60,746
1972	7,675	7,832	252	1,111	1,154	8,136	6,292	..	..	28,674	61,307
1973	7,950	8,340	226	1,290	788	10,791	6,884	..	..	28,691	65,149
1974	7,290	7,167	201	975	494	12,320	6,517	..	..	24,968	60,058
1975	6,373	6,338	199	1,038	222	12,555	6,479	..	..	22,145	55,444
1976	5,902	7,129	131	1,091	68	14,237	6,950	..	..	21,966	57,584
1977	5,947	6,368	158	1,010	30	14,940	7,053	..	..	21,978	57,574
1978	5,627	5,932	179	899	15	15,149	7,222	..	..	21,570	56,673
1979	6,081	6,512	148	977	18	15,663	7,527	..	..	21,590	58,564
1980	5,083	3,335	133	642	13	15,258	6,854	..	..	16,938	48,291
1981	4,534	4,564	116	665	13	14,489	6,622	..	..	14,761	45,776
1982	4,668	4,083	144	605	8	14,588	6,353	..	..	13,530	44,007
1983	4,708	4,307	126	635	5	14,021	6,376	..	..	11,988	42,191
1984	3,796	4,408	68	537	5	14,686	6,758	..	..	10,859	41,138
1985	4,708	4,655	151	768	3	14,865	6,837	..	..	9,701	41,702
1986(11)	5,242	4,144	98	778	3	13,542	6,884	..	..	10,240	40,931
1987	4,048	4,660	80	821	3	14,137	8,005	..	..	8,456	40,211
1988	4,166	5,041	55	771	-	12,883	8,350	..	100	9,441	40,807
1989	4,489	4,286	30	613	-	12,515	8,550	..	102	8,820	39,405
1990	4,172	3,951	42	602	-	12,889	8,655	..	107	8,242	38,660
1991	4,270	3,691	14	570	-	12,311	8,563	..	109	8,729	38,257
1992	4,375	3,601	14	534	-	11,380	8,194	..	279	8,334	36,711
1993	3,553	3,613	7	560	-	11,521	8,328	..	266	8,592	36,440
1994	3,402	3,818	194	590	-	12,885	8,082	..	487	8,253	37,711
1995	2,840	3,750	184	576	-	12,680	8,654	..	526	7,066	36,276
1996	1,959	855	233	439	-	14,081	9,004	..	533	7,058	34,470
1997	1,963	787	249	457	-	14,754	9,189	..	532	6,315	34,577
1998	1,607	803	243	385	-	15,140	9,216	..	461	6,379	34,512
1999	1,353	820	215	205	-	15,203	9,542	1,086	283	5,374	34,222
2000	1,228	753	71	216	-	15,773	9,812	1,099	264	6,039	35,352
2001	1,195	719	210	154	-	15,464	9,573	1,001	243	6,611	35,443
2002	1,186	610	170	78	-	14,202	9,686	1,321	250	6,248	33,977
2003	1,248	589	51	53	-	14,292	9,747	1,128	267	6,899	34,310
2004	1,235r	559	68	67	-	13,238	9,961	832	265	6,918	33,177r
2005	1,180	535	171	79	-	13,017	10,363	831	189	7,227	33,618
2006	1,131r	509	156r	106	-	12,531r	10,139r	809	213r	7,220	32,892r
2007	1,240r	512	176	114	-	11,630r	10,061r	690r	276r	6,827	31,586r
2008	1,247	442	172	87	-	11,393	9,764	773	336	6,360	30,616

(1) Excluding non-energy use of fuels.

(2) Includes the iron and steel industry, but from 1994 onwards excludes iron and steel use of fuels for transformation and energy industry own use purposes.

(3) Blast furnace gas is included in coke and breeze up to 1995 and covers electricity transformation, use by ovens and losses. From 1996 onwards, blast furnace gas is included in the total and covers just coke ovens and losses, which is consistent with the methodology used for compiling the energy balances.

(4) Includes, from 1994, manufactured liquid fuels.

(5) Includes colliery methane. Up to 1988 also includes non-energy use of natural gas.

1.1.5 Energy consumption by final user (energy supplied basis)⁽¹⁾, 1970 to 2008 (continued)

Thousand tonnes of oil equivalent

	Transport											Total (7)
	Rail			Road				Water		Air		
	Coal	Coke and breeze	Electricity (6)	Petroleum	Electricity	Petroleum	Renewables	Coal derived fuel	Coal	Petroleum	Petroleum	
1970	88	35	234	1,254	3	21,406	..	15	88	1,184	3,869	28,174
1971	68	13	237	1,186	-	22,412	..	-	63	1,081	4,247	29,306
1972	53	5	229	1,121	-	23,535	..	-	23	962	4,514	30,442
1973	58	-	224	1,123	-	25,125	..	-	10	1,088	4,806	32,435
1974	50	-	234	1,048	-	24,465	..	-	10	1,239	4,219	31,266
1975	40	-	249	1,000	-	23,948	..	-	8	1,300	4,340	30,885
1976	43	3	247	945	-	24,994	..	-	8	1,317	4,476	32,032
1977	40	3	252	950	-	25,633	..	-	8	1,312	4,678	32,875
1978	45	3	254	967	-	26,946	..	-	5	1,300	5,051	34,571
1979	43	3	254	947	-	27,520	..	-	5	1,363	5,224	35,359
1980	38	3	262	919	-	27,815	..	-	5	1,257	5,242	35,541
1981	38	-	259	877	-	27,009	..	-	-	1,101	5,020	34,304
1982	35	-	229	793	-	27,797	..	-	3	1,186	4,993	35,037
1983	15	-	247	849	-	28,646	..	-	3	1,207	5,093	36,059
1984	3	-	247	816	-	30,006	..	-	-	1,328	5,383	37,782
1985	3	-	254	821	-	30,586	..	-	-	1,254	5,582	38,500
1986(11)	3	-	259	809	-	32,606	..	-	-	1,151	6,126	40,954
1987	3	-	264	761	-	34,062	..	-	-	1,103	6,479	42,672
1988	-	-	282	766	-	36,233	..	-	-	1,159	6,905	45,345
1989	3	-	272	702	-	37,801	..	-	-	1,355	7,308	47,442
1990	2	-	455	668	-	38,816	..	-	-	1,363	7,332	48,635
1991	-	-	454	685	-	38,535	..	-	-	1,424	6,872	47,973
1992	-	-	461	715	-	39,363	..	-	-	1,377	7,435	49,355
1993	-	-	641	665	-	39,502	..	-	-	1,341	7,871	50,024
1994	-	-	599	651	-	39,690	..	-	-	1,239	8,070	50,253
1995	-	-	636	654	-	39,268	..	-	-	1,193	8,485	50,238
1996	-	-	710	629	-	40,772	..	-	-	1,294	8,917	52,321
1997	-	-	729	516	-	41,259	..	-	-	1,256	9,322	53,083
1998	-	-	732	608	-	41,020	..	-	-	1,175	10,237	53,772
1999	-	-	738	632	-	41,399	..	-	-	1,067	11,017	54,853
2000	-	-	741	639	-	41,071	..	-	-	1,032	11,978	55,461
2001	-	-	759	664	-	41,097	..	-	-	844	11,774	55,137
2002	-	-	727	662	-	41,936	..	-	-	702	11,658	55,685
2003	-	-	706	667	-	41,823	..	-	-	1,234	11,936	56,366
2004	-	-	728	700	-	42,221	..	-	-	1,196	12,908	57,753
2005	-	-	758	707	-	42,390	..	-	-	1,372	13,856	59,083
2006	-	-	708r	726	-	42,509	188	-	-	1,812	13,999	59,942r
2007	-	-	696r	700	-	42,846r	362	-	-	1,618	13,906r	60,129r
2008	-	-	725	747	-	41,331	821	-	-	1,764	13,426	58,814

(6) Includes, from 1990, electricity used at transport premises (see footnote 11). See Chapter 5, paragraph 5.14.

(7) Includes small amounts of natural gas for road transport.

1.1.5 Energy consumption by final user (energy supplied basis)⁽¹⁾, 1970 to 2008 (continued)

Thousand tonnes of oil equivalent

Domestic									
	Coal	Coke and breeze	Other solid fuels	Natural gas (8)	Electricity	Heat sold	Renewables	Petroleum	Total (4)
1970	14,242	1,761	1,975	8,922	6,622	..	..	3,363	36,884
1971	12,164	1,136	2,156	9,900	6,937	..	..	3,328	35,621
1972	10,602	849	2,144	11,359	7,471	..	..	3,836	36,261
1973	10,565	778	2,053	12,129	7,849	..	..	4,202	37,576
1974	9,968	821	1,955	13,562	7,963	..	..	3,733	38,002
1975	8,517	645	1,778	14,840	7,670	..	..	3,612	37,062
1976	7,910	549	1,640	15,602	7,318	..	..	3,615	36,634
1977	8,136	534	1,589	16,600	7,386	..	..	3,653	37,898
1978	7,476	471	1,464	18,291	7,378	..	..	3,610	38,689
1979	7,688	479	1,431	20,718	7,711	..	..	3,539	41,566
1980	6,575	401	1,370	21,258	7,403	..	..	2,834	39,841
1981	6,214	368	1,202	22,076	7,260	..	..	2,554	39,674
1982	6,242	365	1,146	21,963	7,116	..	..	2,385	39,218
1983	5,796	335	1,141	22,346	7,129	..	..	2,267	39,014
1984	4,733	335	728	22,502	7,212	..	..	2,385	37,896
1985	6,290	385	957	24,394	7,582	..	..	2,454	42,062
1986(11)	6,121	335	965	25,797	7,892	..	..	2,590	43,700
1987	5,189	315	1,018	26,450	8,015	..	..	2,474	43,460
1988	4,741	300	907	25,833	7,940	..	205	2,441	42,367
1989	3,719	239	815	24,988	7,935	..	207	2,355	40,258
1990	3,153	254	762	25,835	8,066	..	206	2,480	40,756
1991	3,582	210	785	28,721	8,436	..	209	2,825	44,768
1992	3,105	176	709	28,389	8,555	..	243	2,889	44,066
1993	3,498	147	751	29,254	8,639	..	241	3,019	45,549
1994	2,957	67	601	28,355	8,721	..	242	3,004	43,947
1995	2,077	78	470	28,037	8,790	..	242	2,997	42,691
1996	2,084	129	588	32,317	9,244	..	241	3,518	48,120
1997	1,992	59	419	29,710	8,982	..	225	3,389	44,775
1998	1,819	85	439	30,601	9,408	..	230	3,543	46,126
1999	1,916	86	410	30,788	9,485	44	230	3,162	46,121
2000	1,448	95	365	31,806	9,617	44	236	3,239	46,851
2001	1,461	48	328	32,625	9,917	32	240	3,527	48,178
2002	1,009	127	289	32,362	9,848	33	243	3,087	46,999
2003	813	92	255	33,232	9,954	11	247	3,068	47,670
2004	733	36	230	34,085	9,933	52	252	3,265	48,587
2005	474	24	199	33,019	10,044	52	340	3,093	47,245
2006	425r	8	207r	31,457r	10,013	52	358r	3,251	45,771r
2007	487	11	182r	30,348r	9,893	52	400r	2,877	44,248r
2008	515	10	229	31,239	10,132	52	430	3,033	45,642

(8) Includes town gas prior to 1989. (Separate figures maybe found in previous editions of this Digest).

1.1.5 Energy consumption by final user (energy supplied basis)⁽¹⁾, 1970 to 2008 (continued)

Thousand tonnes of oil equivalent

Other final users (9)								
	Coal	Coke and breeze	Natural gas (8)	Electricity	Heat sold	Renewables	Petroleum	Total (4)
1970	2,723	1,499	1,919	3,408	..	..	9,038	18,586
1971	2,328	688	2,181	3,534	..	..	9,184	17,915
1972	2,013	537	2,509	3,650	..	..	9,487	18,195
1973	1,731	602	2,728	3,940	..	..	9,585	18,586
1974	1,685	567	3,197	3,642	..	..	8,401	17,492
1975	1,234	408	3,393	3,894	..	..	8,431	17,360
1976	1,300	335	3,831	4,023	..	..	8,668	18,157
1977	1,370	315	3,998	4,257	..	..	9,157	19,097
1978	1,300	275	4,393	4,481	..	..	8,764	19,213
1979	1,307	285	4,955	4,731	..	..	8,754	20,031
1980	1,154	237	5,194	4,733	..	..	7,403	18,721
1981	1,174	204	5,315	4,804	..	..	7,096	18,592
1982	1,222	212	5,486	4,867	..	..	6,678	18,464
1983	1,166	257	5,915	5,106	..	..	6,403	18,847
1984	1,141	252	6,101	5,063	..	..	6,381	18,938
1985	1,123	297	6,718	5,446	..	..	6,018	19,603
1986(11)	982	390	7,308	5,731	..	..	5,723	20,135
1987	935	368	7,534	5,965	..	..	4,988	19,790
1988	831	264	7,569	6,240	..	138	5,008	20,050
1989	698	119	7,278	6,497	..	138	4,345	19,075
1990	795	127	7,329	6,426	..	139	4,402	19,218
1991	753	105	8,640	6,717	..	149	4,456	20,820
1992	622	88	8,585	6,996	..	150	4,518	20,959
1993	566	74	8,504	6,999	..	146	4,446	20,735
1994	496	34	8,695	6,951	..	172	4,289	20,637
1995	362	39	9,374	7,199	..	189	4,016	21,179
1996	385	-	10,138	7,495	..	181	3,909	22,108
1997	375	-	9,697	7,859	..	174	3,362	21,467
1998	291	-	10,114	7,788	..	174	3,144	21,511
1999	189	-	9,156	7,986	1,368	174	2,464	21,338
2000	57	-	9,498	8,155	1,371	172	2,294	21,547
2001	47	-	9,726	8,359	1,294	173	2,568	22,167
2002	14	-	8,670	8,406	730	189	1,805	19,815
2003	17	-	9,177	8,503	648	196	1,145	19,686
2004	19	-	9,757	8,523	373	198	1,438	20,308
2005	34	-	9,243	8,626	386	198	1,754	20,241
2006	20	-	8,871r	8,744r	384	178	1,529	19,727r
2007	14	-	8,575r	8,702r	386r	183r	1,501	19,360r
2008	13	-	9,069	8,747	385	185	1,421	19,820

(9) Mainly agriculture, public administration and commerce. Prior to 1990, including electricity used at transport premises (see footnote 6).

1.1.5 Energy consumption by final user (energy supplied basis)⁽¹⁾, 1970 to 2008 (continued)

Thousand tonnes of oil equivalent

All final users											
	Coal	Coke and breeze	Other solid fuels (4)	Coke oven gas	Town gas	Natural gas (4)	Electricity	Heat sold	Renewables	Petroleum	Total (3)(10)
1970	29,822	12,950	2,184	1,164	10,746	3,662	16,542	..	..	68,511	145,977
1971	24,855	10,134	2,333	1,118	8,882	9,431	17,021	..	..	69,568	143,589
1972	20,366	9,222	2,396	1,111	8,094	15,063	17,643	..	..	72,129	146,205
1973	20,313	9,721	2,280	1,290	5,852	20,584	18,898	..	..	74,620	153,744
1974	19,003	8,555	2,156	975	3,836	25,736	18,356	..	..	68,072	146,818
1975	16,172	7,391	1,977	1,038	1,796	29,212	18,293	..	..	64,776	140,751
1976	15,162	8,016	1,771	1,091	534	33,204	18,537	..	..	65,981	144,407
1977	15,502	7,220	1,748	1,010	174	35,393	18,948	..	..	67,361	147,444
1978	14,454	6,681	1,642	899	81	37,766	19,336	..	..	68,208	149,146
1979	15,124	7,279	1,579	977	91	42,262	20,223	..	..	68,937	155,521
1980	12,854	3,975	1,504	642	76	41,647	19,252	..	..	62,408	142,394
1981	11,960	5,136	1,317	665	65	41,828	18,945	..	..	58,420	138,346
1982	12,169	4,660	1,290	605	55	41,990	18,567	..	..	57,360	136,726
1983	11,688	4,899	1,267	635	45	42,242	18,856	..	..	56,453	136,111
1984	9,673	4,995	796	537	43	43,251	19,280	..	..	57,158	135,753
1985	12,124	5,338	1,108	768	40	45,940	20,118	..	..	56,416	141,867
1986(11)	12,348	4,869	1,063	778	28	46,622	20,763	..	..	59,245	145,719
1987	10,174	5,343	1,098	821	28	48,096	22,252	..	..	58,325	146,132
1988	9,738	5,605	962	771	8	46,277	22,811	..	443	61,952	148,569
1989	8,909	4,645	845	613	-	44,780	23,254	..	447	62,685	146,180
1990	8,122	4,333	804	602	-	46,052	23,601	..	451	63,302	147,268
1991	8,605	4,006	799	570	-	49,676	24,170	..	467	63,525	151,818
1992	8,101	3,866	723	534	-	48,357	24,206	..	672	64,632	151,091
1993	7,617	3,833	758	560	-	49,282	24,607	..	652	65,437	152,747
1994	6,855	3,919	795	590	-	49,935	24,353	..	901	65,196	152,548
1995	5,279	3,867	654	576	-	50,107	25,279	..	956	63,679	150,399
1996	4,429	984	821	439	-	56,536	26,453	..	954	66,096	157,019
1997	4,331	846	667	457	-	54,162	26,759	..	930	65,418	153,902
1998	3,716	889	682	385	-	55,856	27,143	..	865	66,107	155,921
1999	3,458	906	625	205	-	55,148	27,751	2,498	688	65,116	156,534
2000	2,733	848	436	216	-	57,077	28,325	2,515	672	66,293	159,211
2001	2,704	766	539	154	-	57,814	28,609	2,327	656	67,084	160,926
2002	2,209	737	459	78	-	55,234	28,667	2,084	682	66,099	156,476
2003	2,078	680	305	53	-	56,701	28,910	1,787	710	66,772	158,032
2004	1,988	595	299	67	-	57,080	29,144	1,258	715	68,647	159,824r
2005	1,687	559	370	79	-	55,279	29,791	1,268	727	70,399	160,186
2006	1,575r	518	363r	106	-	52,860r	29,604r	1,245	938r	71,046	158,333r
2007	1,741r	523	358r	114	-	50,553r	29,352r	1,128r	1,220r	70,275r	155,324r
2008	1,776	452	402	87	-	51,701	29,369	1,209	1,772	68,083	154,892

(10) Before 1971 includes the use for transport of liquid fuel made from coal.

(11) See paragraph 1.1.15 about changed treatment of electricity produced, and fuel used by, companies other than major power producers.

1.1.6 Expenditure on energy by final user, to 2008⁽¹⁾

£million

	Industry					Domestic				
	Coal and solid fuels (3)	Natural gas (4)	Electricity	Petroleum products (5)	Total (6)	Coal and solid fuels (3)	Natural gas (4)	Electricity	Petroleum products (5)	Total (6)
1970	285	70	475	300	1,130	395	385	645	85	1,510
1971	285	85	530	350	1,250	385	430	730	90	1,635
1972	280	120	540	345	1,285	360	505	830	110	1,805
1973	320	150	595	390	1,455	370	535	885	140	1,930
1974	410	195	775	880	2,260	405	605	1,070	200	2,280
1975	545	240	1,015	920	2,720	440	760	1,495	235	2,930
1976	720	380	1,260	1,065	3,425	500	1,000	1,825	295	3,620
1977	780	535	1,470	1,305	4,090	595	1,205	2,135	360	4,295
1978	800	695	1,670	1,255	4,420	620	1,365	2,380	370	4,735
1979	1,010	820	1,925	1,570	5,325	770	1,575	2,675	475	5,495
1980	675	1,060	2,185	1,815	5,735	920	1,875	3,310	510	6,615
1981	850	1,215	2,420	1,890	6,375	960	2,460	3,905	560	7,885
1982	860	1,335	2,560	1,870	6,625	995	3,070	4,200	610	8,875
1983	900	1,375	2,655	1,800	6,730	1,015	3,520	4,300	645	9,480
1984	845	1,555	2,695	1,810	6,905	830	3,655	4,495	640	9,620
1985	990	1,735	2,750	1,740	7,215	1,120	4,090	4,840	665	10,715
1986	1,000	1,350	2,765	1,065	6,180	1,135	4,385	5,105	460	11,085
1987	865	1,375	3,285	865	6,390	990	4,465	5,140	410	11,005
1988	880	1,225	3,590	785	6,480	830	4,385	5,340	365	10,920
1989	905	1,210	3,965	845	6,925	730	4,455	5,800	390	11,375
1990	930	1,260	3,985	900	7,075	700	4,865	6,255	485	12,305
1991	910	1,115	4,120	905	7,050	795	5,775	7,105	460	14,135
1992	775	970	4,180	790	6,715	710	5,685	7,460	460	14,315
1993	740	915	3,940	895	6,490	780	5,705	7,590	465	14,540
1994	650	1,010	3,855	865	6,380	685	6,020	7,870	455	15,030
1995	605	1,015	3,970	830	6,420	615	6,010	8,060	470	15,155
1996	590	755	3,900	965	6,210	640	6,510	8,380	630	16,165
1997	565	870	3,625	890	5,950	560	6,125	7,965	560	15,210
1998	545	990	3,535	715	5,785	525	6,015	7,595	465	14,600
1999	430	970	3,730	735	5,865	540	5,610	7,600	465	14,215
2000	430	1,115	3,435	1,145	6,125	465	5,485	7,475	735	14,160
2001	445	1,470	3,145	1,235	6,295	535	5,735	7,540	715	14,525
2002	365	1,280	2,995	1,065	5,705	465	6,090	7,510	645	14,710
2003	380	1,345	2,925	1,240	5,890	320	6,260	7,660	730	14,970
2004	525	1,480	3,255	1,485	6,745	285	8,285	9,120	805	18,495
2005	740	2,110	5,060	2,015	9,925	215	8,215	9,665	1,010	19,105
2006	815r	2,635r	6,775	2,420	12,645r	205	10,100r	11,340r	1,225	22,870r
2007	765r	2,000r	6,970r	2,365r	12,100r	230	9,950r	11,755r	1,130	23,065r
2008	1,175	2,810	8,340	3,105	15,430	285	12,345	13,940	1,695	28,265

(1) All data is to the nearest £5 million. VAT is only included where not refundable. Methodology used to calculate the series has changed over the years, as such the data provides a guide to changing patterns of expenditure on energy, but not too much significance should be drawn from small changes.

(2) Includes commercial, public administration, agriculture and all fuels used for transport purposes.

(3) Includes coal, coke, breeze and other manufactured solid fuel. Prior to 1996, an estimate of the value of coke produced in coke ovens owned by the iron and steel industry was included, this has now been replaced by an estimate of the value of coal purchased for such ovens, which is the actual monetary trade.

(4) Includes town gas.

(5) Includes heating oils, LPG etc. Excludes motor transport fuels.

(6) Excludes other fuels not listed eg crude oil, coke oven gas etc.

1.1.6 Expenditure on energy by final user, to 2008⁽¹⁾ (continued)

£million

Other final users (2)						All final users					
Coal and solid fuels (3)	Natural gas (4)	Electricity	Petroleum products (5)	Of which road transport	Total (6)	Coal and solid fuels (3)	Natural gas (4)	Electricity	Petroleum products (5)	Total (6)	
60	70	390	1,910	1,720	2,430	740	525	1,510	2,295	5,070	1970
45	80	435	2,105	1,885	2,665	715	595	1,695	2,545	5,550	1971
45	80	480	2,305	2,070	2,910	685	705	1,850	2,760	6,000	1972
45	90	515	2,580	2,305	3,230	735	775	1,995	3,110	6,615	1973
60	105	590	3,885	3,150	4,640	875	905	2,435	4,965	9,180	1974
70	140	835	4,685	3,845	5,730	1,055	1,140	3,345	5,840	11,380	1975
90	200	1,030	5,305	4,325	6,625	1,310	1,580	4,115	6,665	13,670	1976
115	255	1,200	6,030	4,835	7,600	1,490	1,995	4,805	7,695	15,985	1977
115	310	1,375	6,075	4,890	7,875	1,535	2,370	5,425	7,700	17,030	1978
130	385	1,655	8,265	6,660	10,435	1,910	2,780	6,255	10,310	21,255	1979
115	520	1,985	10,735	8,650	13,355	1,710	3,455	7,480	13,060	25,705	1980
110	585	2,460	12,345	10,060	15,500	1,920	4,260	8,785	14,795	29,760	1981
135	655	2,690	13,470	10,950	16,950	1,990	5,060	9,450	15,950	32,450	1982
135	745	2,855	14,965	12,240	18,700	2,050	5,640	9,810	17,410	34,910	1983
135	795	2,980	16,140	13,250	20,050	1,810	6,005	10,170	18,590	36,575	1984
155	920	3,265	17,640	14,615	21,980	2,265	6,745	10,855	20,045	39,910	1985
140	1,045	3,485	15,845	13,745	20,515	2,275	6,780	11,355	17,370	37,780	1986
125	1,035	3,490	16,630	14,525	21,280	1,980	6,870	11,915	17,905	38,670	1987
95	1,025	3,810	16,855	14,960	21,785	1,805	6,635	12,740	18,005	39,185	1988
95	1,015	4,185	18,755	16,690	24,050	1,730	6,680	13,950	19,980	42,340	1989
105	1,085	4,465	21,120	19,020	26,775	1,735	7,210	14,705	22,505	46,155	1990
85	1,310	4,960	21,900	19,995	28,255	1,790	8,200	16,185	23,265	49,440	1991
95	1,245	5,495	22,455	20,825	29,290	1,580	7,900	17,135	23,705	50,320	1992
70	1,155	5,555	24,365	22,540	31,145	1,590	7,775	17,115	25,725	52,205	1993
50	1,125	5,380	25,190	23,515	31,745	1,385	8,155	17,140	26,510	53,190	1994
35	1,110	5,300	25,895	24,140	32,340	1,255	8,135	17,330	27,195	53,915	1995
30	975	5,405	28,240	26,145	34,650	1,260	8,240	17,685	29,835	57,020	1996
35	855	5,420	30,645	28,685	36,955	1,165	7,850	17,010	32,095	58,120	1997
25	885	5,200	31,375	29,810	37,485	1,095	7,885	16,335	32,555	57,870	1998
10	780	4,990	38,435	36,680	44,215	980	7,355	16,330	39,640	64,305	1999
5	850	4,950	38,860	35,635	44,665	890	7,445	15,860	40,740	64,935	2000
5	1,110	4,330	37,195	34,320	42,640	985	8,310	15,020	39,145	63,460	2001
-	1,025	4,050	36,355	34,020	41,430	830	8,395	14,550	38,065	61,840	2002
5	1,120	3,830	38,160	35,055	43,115	695	8,720	14,415	40,250	64,080	2003
5	1,320	4,355	46,560	42,975	52,240	815	11,085	16,730	48,850	77,480	2004
-	1,655	5,405	49,480	44,535	56,540	960	11,980	20,135	52,505	85,580	2005
5r	2,155	6,720	52,905	46,880	61,785r	1,025r	14,890r	24,835r	56,550r	97,300r	2006
-	2,085	7,285r	54,740r	48,905r	64,110r	995r	14,035r	26,010r	58,235r	99,275r	2007
-	2,525	8,395	66,755	57,130	77,675	1,460	17,680	30,675	71,555	121,370	2008

1.1.7 Mean air temperatures (deviations) ⁽¹⁾⁽²⁾

Great Britain

	Degrees Celsius									
	Average 1971-2000	Deviations from normal (average 1971-2000)								
		2000	2001	2002	2003	2004	2005	2006	2007	2008
Calendar year	9.7	+0.8	+0.5	+1.1	+1.0	+0.9	+0.8	+1.1	+0.9	+0.3
First half year	8.1	+0.9	-0.0	+1.3	+1.1	+1.0	+0.8	+0.2	+1.6	+0.7
Second half year	11.2	+0.7	+1.0	+0.8	+0.8	+0.8	+0.8	+2.0	+0.1	-0.2
First quarter	5.1	+1.4	-0.4	+1.9	+0.6	+0.8	+1.0	-0.5	+1.6	+0.9
Second quarter	11.1	+0.4	+0.3	+0.8	+1.5	+1.2	+0.7	+0.9	+1.5	+0.6
Third quarter	15.2	+0.8	+0.7	+0.6	+1.5	+0.8	+0.7	+2.1	-0.3	+0.2
Fourth quarter	7.3	+0.5	+1.2	+1.0	+0.2	+0.8	+0.8	+1.8	+0.6	-0.5
Summer (3)	13.1	+0.6	+0.5	+0.7	+1.5	+1.0	+0.7	+1.5	+0.6	+0.4
Winter (3)	6.2	+0.1	+1.6	+0.9	+0.5	+0.9	+0.1	+1.7	+0.7	-0.3
January	4.3	+1.2	-0.4	+1.8	+0.5	+1.2	+2.0	+0.2	+2.6	+2.1
February	4.5	+1.9	+0.3	+2.7	-0.1	+1.1	-0.0	-0.4	+1.5	+0.8
March	6.2	+1.3	-0.7	+1.4	+1.6	+0.4	+1.0	-1.2	+0.9	-0.1
April	7.9	-0.0	-0.1	+1.4	+2.0	+1.6	+0.9	+0.6	+3.2	+0.0
May	11.0	+1.0	+1.4	+0.9	+1.0	+1.1	+0.2	+0.8	+0.8	+2.0
June	13.7	+1.0	+0.3	+0.6	+2.2	+1.6	+1.6	+2.0	+1.2	+0.3
July	16.2	-1.0	+0.5	-0.3	+1.3	-0.5	+0.4	+3.0	-1.0	+0.0
August	16.0	+0.7	+0.7	+0.9	+2.0	+1.3	+0.1	+0.1	-0.5	+0.2
September	13.6	+2.3	+0.4	+0.8	+0.7	+1.1	+1.4	+2.8	+0.2	-0.1
October	10.3	+0.2	+3.2	-0.1	-1.3	+0.2	+2.7	+2.4	+0.7	-0.6
November	7.0	+0.2	+1.0	+1.8	+1.4	+1.0	-0.6	+1.1	+0.6	+0.0
December	5.1	+0.7	-1.0	+0.8	-0.1	+0.6	-0.3	+1.3	-0.1	-1.4

(1) Latest monthly figures available at www.decc.gov.uk/en/content/cms/statistics/source/temperatures/temperatures.aspx

(2) Average mean air temperatures calculated from the maximum and minimum daily temperature as recorded at 17 meteorological stations, selected as representative of fuel consumption in Great Britain - 2 in Scotland, 2 in Wales and 13 in England, 4 of which are counted twice. Data on temperatures recorded are provided by the Meteorological Office.

(3) The summer period is from April to September inclusive, and the winter period is the six months beginning in October and ending with March of the following year.

1.1.8 Mean air temperatures (averages) ⁽¹⁾⁽²⁾, 1970 to 2008 Great Britain

	Degrees Celsius											
	January	February	March	April	May	June	July	August	September	October	November	December
1970	4.0	3.2	4.0	6.8	12.7	16.1	15.4	16.1	14.5	10.9	7.9	4.5
1971	4.7	5.0	5.4	7.8	11.5	12.5	16.9	15.6	14.3	11.6	6.4	7.1
1972	4.2	4.6	6.5	8.6	10.6	11.9	15.5	15.2	11.9	10.7	6.4	5.8
1973	4.7	4.7	6.5	7.2	11.3	14.9	15.7	16.5	14.3	9.4	6.2	5.1
1974	6.1	5.8	5.8	8.0	10.9	13.7	15.1	15.2	12.1	7.9	6.7	8.0
1975	6.7	4.7	5.0	8.3	9.7	14.5	17.2	18.2	13.4	10.2	6.3	5.3
1976	5.9	4.8	5.0	8.0	11.8	16.7	18.3	17.3	13.4	10.7	6.2	2.2
1977	3.0	5.1	7.0	7.3	10.4	12.4	15.9	15.3	13.1	11.7	6.4	6.2
1978	3.4	3.6	6.8	6.4	11.3	13.6	14.7	14.9	14.0	11.9	8.6	4.3
1979	0.5	1.4	4.8	7.6	9.7	14.1	16.2	14.9	13.2	11.2	7.0	5.5
1980	2.4	6.0	4.9	8.7	11.0	13.8	14.5	15.7	14.6	9.0	6.6	5.8
1981	4.8	3.3	6.6	7.8	10.5	13.3	15.6	16.2	14.6	7.6	7.7	0.8
1982	2.8	4.8	5.8	8.2	11.1	11.2	16.2	15.4	13.8	9.8	7.4	4.1
1983	6.2	1.9	6.1	6.3	9.6	13.6	18.4	16.8	13.2	10.0	7.3	5.5
1984	3.3	3.5	4.5	7.7	9.5	13.9	16.2	17.0	13.2	10.7	7.7	5.0
1985	1.0	2.5	4.4	8.0	10.4	12.2	15.6	14.2	14.1	10.7	4.0	6.1
1986	3.2	-0.5	4.9	5.4	10.6	14.1	15.4	13.2	11.0	10.6	7.3	5.8
1987	1.1	3.7	4.1	9.4	9.7	12.2	15.5	15.2	13.3	9.3	6.4	4.7
1988	4.9	4.5	5.8	7.8	11.2	14.0	14.4	14.9	13.2	9.4	5.3	7.1
1989	6.1	5.8	7.0	6.1	12.5	14.0	17.4	16.1	14.1	11.5	6.4	4.5
1990	6.3	7.0	8.0	7.7	12.1	13.3	16.3	17.6	13.1	12.0	7.2	5.1
1991	3.7	2.4	7.8	8.0	11.0	12.2	17.1	17.0	14.7	10.3	7.0	5.0
1992	4.0	5.9	7.4	8.6	13.1	15.5	16.1	15.3	13.2	7.8	7.5	4.1
1993	6.0	5.4	6.6	9.3	11.2	14.4	15.1	14.4	12.5	8.5	5.0	5.3
1994	5.2	3.5	7.6	8.1	10.4	14.3	17.6	15.9	12.7	10.2	10.1	6.4
1995	4.9	6.7	5.6	8.9	11.6	14.0	18.4	18.9	13.8	13.2	8.1	2.8
1996	4.8	3.1	4.6	8.7	9.3	14.4	16.4	16.7	13.7	11.8	6.2	3.5
1997	2.9	6.9	8.4	9.1	11.5	14.0	16.9	18.6	14.5	10.5	8.9	6.1
1998	5.5	7.7	8.0	7.8	12.9	14.1	15.5	15.9	14.8	10.6	7.3	5.9
1999	5.8	5.6	7.4	9.4	12.8	13.7	17.5	16.3	15.7	11.0	8.1	5.0
2000	5.5	6.4	7.5	7.9	12.1	14.7	15.2	16.7	15.9	10.5	7.1	5.8
2001	3.9	4.8	5.5	7.8	12.4	14.0	16.7	16.7	14.1	13.6	7.9	4.1
2002	6.1	7.2	7.6	9.4	11.9	14.3	15.9	17.0	14.5	10.3	8.8	6.0
2003	4.9	4.5	7.8	9.9	12.1	15.9	17.5	18.0	14.3	9.0	8.4	5.0
2004	5.5	5.6	6.6	9.6	12.1	15.3	15.7	17.4	14.8	10.6	8.0	5.7
2005	6.4	4.5	7.2	8.8	11.2	15.4	16.6	16.1	15.0	13.0	6.4	4.8
2006	4.5	4.2	5.0	8.5	11.8	15.8	19.3	16.2	16.4	12.8	8.1	6.4
2007	6.9	6.0	7.1	11.2	11.9	14.9	15.2	15.5	13.9	11.0	7.5	5.0
2008	6.4	5.4	6.1	7.9	13.0	14.0	16.3	16.2	13.5	9.8	7.0	3.7
2009	3.3	4.4	6.9	9.7	11.9	14.8						

(1) Latest monthly figures available at www.decc.gov.uk/en/content/cms/statistics/source/temperatures/temperatures.aspx

(2) Average mean air temperatures calculated from the maximum and minimum daily temperature as recorded at 17 meteorological stations, selected as representative of fuel consumption in Great Britain - 2 in Scotland, 2 in Wales and 13 in England, 4 of which are counted twice. Data on temperatures recorded are provided by the Meteorological Office.

Chapter 2: Long term trends

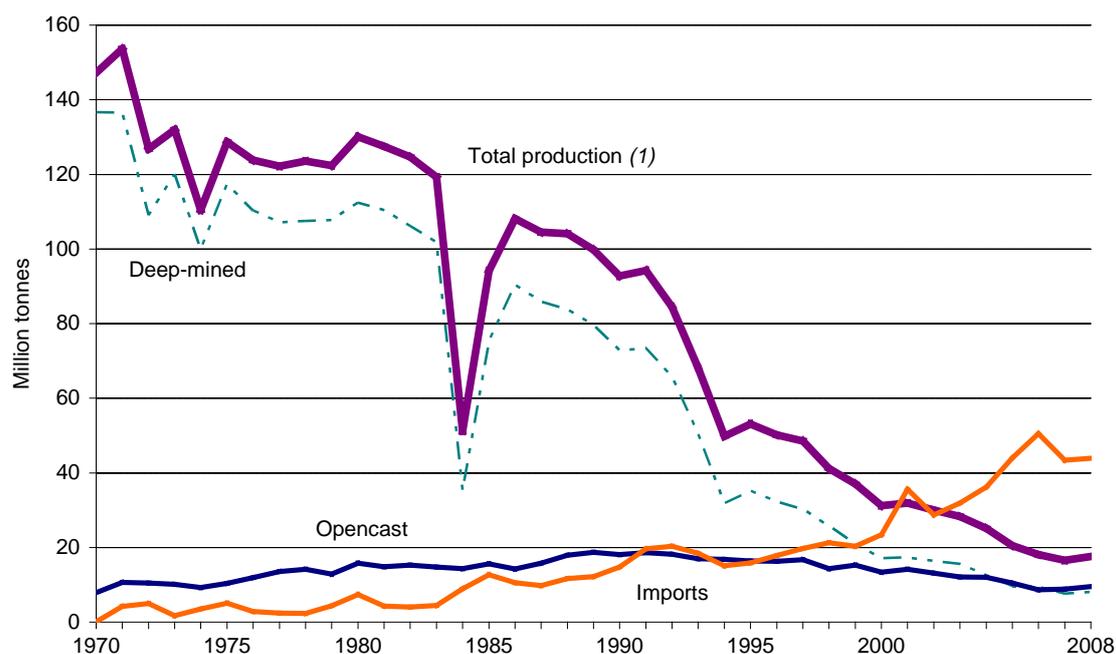
Solid fuels and derived gases

Coal production and stocks (Table 2.1.1)

2.1.1 Figures for coal production, imports, overseas shipments and stocks are given in Table 2.1.1, which is based on Table 2.7 of Chapter 2 of the main Digest. The table series extends back to 1970.

2.1.2 Table 2.1.1 shows a decline in deep-mined production of 94 per cent since the highest level shown in this table in 1970. Opencast production in 2008 was 21 per cent higher than its lowest level in 1970. Table 2.1.1 also shows that imports, initially of coal types in short supply in this country, started in 1970. Imports grew steadily to reach the 20 million tonnes a year mark by the late 1990s. The very rapid expansion of imports in 2001 meant that imports exceeded the level of UK production for the first time. In 2002 imports fell sharply and were slightly lower than UK production but picked up in 2003 and exceeded production again. This rapid growth continued and in 2006 reached a new record of 51 million tonnes (75 per cent of coal supplied). In 2007, imports fell back from this peak by 14 per cent to just over 43 million tonnes and only increased by a small amount in 2008 (0.51 million tonnes). These trends are illustrated in Chart 2.1.1.

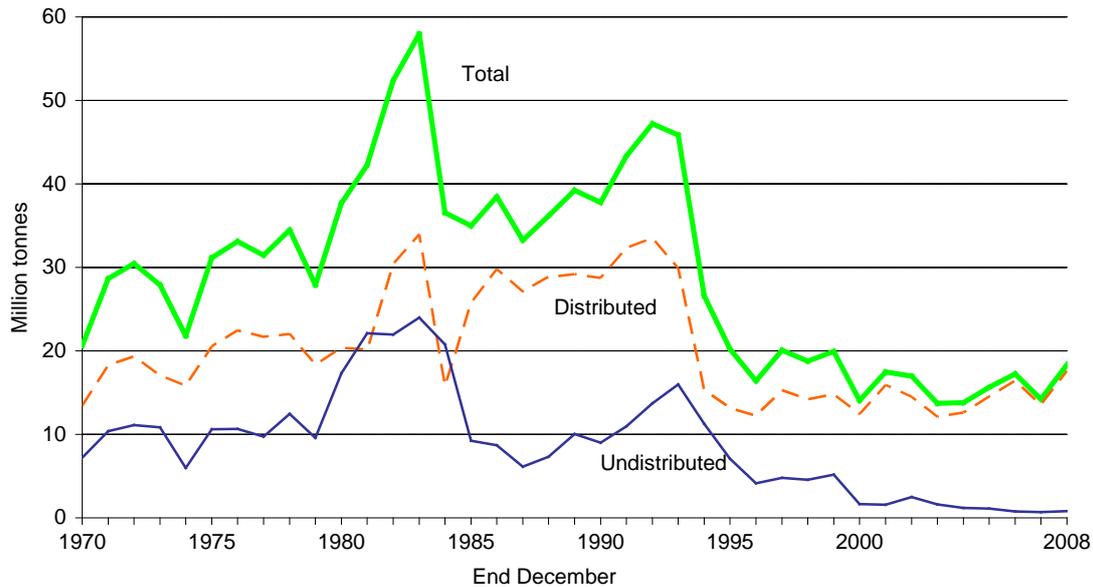
Chart 2.1.1: Coal production and imports 1970 to 2008



(1) Includes slurry.

2.1.3 Stock levels in the early 1990s were relatively high, reaching a peak of 53 per cent of annual inland coal consumption in 1993. After this, electricity generators began to run down their stocks sharply, falling to just 23 per cent of annual consumption by the end of 1996. This share, however, then increased again to 36 per cent by the end of 1999. During the next few years, stocks fluctuated between 22 and 29 per cent before settling at around 25 per cent in 2005 and 2006. In 2007, stocks fell to 23 per cent of annual consumption before increasing to 32 per cent of annual consumption in 2008. Trends in coal stocks are shown in Chart 2.1.2 below.

Chart 2.1.2: Coal stocks 1970 to 2008



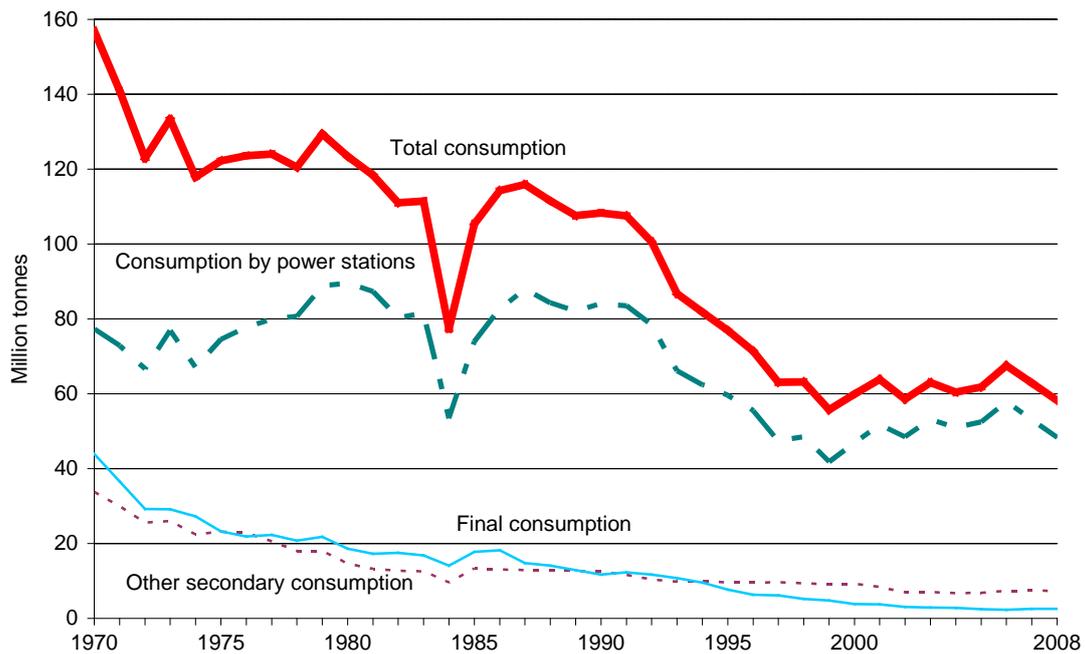
Inland consumption of solid fuels (Table 2.1.2)

2.1.4 Figures for inland consumption of coal by fuel producers and final users are given in Table 2.1.2, which are based on Table 2.7 of Chapter 2 of the main Digest. The table also shows final consumption figures for coke and breeze, and other solid fuels based on Table 2.8 of Chapter 2. These products are mainly supplied from the conversion of coal, supplemented by a small amount of foreign trade. Where possible the series have been extended back to 1970.

2.1.5 Trends in inland consumption of coal, in total and by power stations, coke ovens and final consumers, are illustrated in Chart 2.1.3 below.

2.1.6 Total inland consumption of coal fell by 63 per cent from 157 million tonnes in 1970 to 58 million tonnes in 2008. Consumption by the electricity generators increased from 77 million tonnes in 1970 to a peak of 90 million tonnes in 1980 and continued in the 80-90 million tonnes range until 1991, with the exception of the miners' strike years. With the increased use of nuclear power and natural gas, the consumption of coal by the generators fell steadily after 1991 until 1999, except in 1998, when coal fired generation was called upon to make up for the temporary reduction in imported electricity from France. Coal fired generation has varied throughout the last several years due to nuclear generation suffering a large number of outages for repair and maintenance and fluctuations in gas prices. At 48 million tonnes in 2008, use of coal at power stations represents 83 per cent of total coal consumption compared with only 49 per cent in 1970.

Chart 2.1.3: Inland consumption of coal, 1970 to 2008



Power stations only include all generators from 1987 (see footnote (1) to Table 2.1.2).

2.1.7 A more detailed examination of historical coal statistics was published in the September 2001 issue of Energy Trends. This looked at trends in coal production, consumption and employment in the coal mining industry over the last 150 years. The updated data set on which the article is based includes data for 2008 and is available on the Department of Energy and Climate Change (DECC) website at: www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx

The original article is to be found at: www.berr.gov.uk/files/file30455.pdf (on page 15)

2.1.1 Coal production and stocks 1970 to 2008⁽⁴⁾

	Coal production					Coal stocks (at year end) (1)		
	Total (2)	Deep-mined	Opencast	Imports (3)	Exports	Total	Distributed	Undistributed
1970	147,195	136,686	7,885	79	3,191	20,630	13,414	7,216
1971	153,683	136,478	10,666	4,241	2,667	28,664	18,271	10,393
1972	126,834	109,086	10,438	4,998	1,796	30,460	19,351	11,110
1973	131,984	120,030	10,123	1,675	2,693	27,886	17,035	10,850
1974	110,452	99,993	9,231	3,547	1,865	21,807	15,827	5,979
1975	128,683	117,412	10,414	5,083	2,182	31,159	20,541	10,618
1976	123,801	110,265	11,944	2,837	1,436	33,115	22,457	10,658
1977	122,150	107,123	13,551	2,439	1,835	31,444	21,704	9,740
1978	123,577	107,528	14,167	2,352	2,253	34,475	22,038	12,437
1979	122,369	107,775	12,862	4,375	2,175	27,908	18,339	9,569
1980	130,097	112,430	15,779	7,334	3,809	37,687	20,370	17,317
1981	127,469	110,473	14,828	4,290	9,113	42,253	20,136	22,117
1982	124,711	106,161	15,266	4,063	7,447	52,377	30,422	21,955
1983	119,254	101,742	14,706	4,456	6,561	57,960	33,964	23,996
1984	51,182	35,243	14,306	8,894	2,293	36,548	15,794	20,753
1985	94,111	75,289	15,569	12,732	2,432	34,979	25,752	9,228
1986	108,099	90,366	14,275	10,554	2,677	38,481	29,776	8,704
1987	104,533	85,957	15,786	9,781	2,353	33,246	27,104	6,142
1988	104,066	83,762	17,899	11,685	1,822	36,166	28,834	7,332
1989	99,820	79,628	18,657	12,137	2,049	39,244	29,191	10,053
1990	92,762	72,899	18,134	14,783	2,307	37,760	28,747	9,013
1991	94,202	73,357	18,636	19,611	1,824	43,321	32,343	10,977
1992	84,493	65,800	18,187	20,339	973	47,207	33,493	13,714
1993	68,199	50,457	17,006	18,400	1,114	45,860	29,872	15,989
1994	49,785	31,854	16,804	15,088	1,236	26,572	15,301	11,271
1995	53,037	35,150	16,369	15,896	859	20,230	13,126	7,104
1996	50,197	32,223	16,315	17,799	988	16,405	12,252	4,153
1997	48,495	30,281	16,700	19,757	1,146	20,088	15,285	4,803
1998	41,177	25,731	14,315	21,244	971	18,767	14,202	4,565
1999	37,077	20,888	15,275	20,293	761	19,931	14,774	5,157
2000	31,198	17,188	13,412	23,446	660	14,077	12,431	1,646
2001	31,930	17,347	14,166	35,542	550	17,468	15,885	1,583
2002	29,989	16,391	13,148	28,686	537	16,968	14,486	2,482
2003	28,279	15,633	12,126	31,891	543	13,731	12,107	1,624
2004	25,096	12,542	11,993	36,153	622	13,791	12,598	1,192
2005	20,498	9,563	10,445	43,968	536	15,628	14,527	1,101
2006	18,079	9,444	8,635	50,529	443	17,226r	16,442r	783
2007	16,540	7,674	8,866	43,365	544r	14,215r	13,525r	691
2008	17,604	8,096	9,509	43,875	599	18,371	17,576	795

(1) Excludes distributed stocks held in merchants' yards, etc, mainly for the domestic market and stocks held by the industrial sector.

(2) Includes estimates for slurry etc recovered from dumps, ponds, rivers etc.

(3) The 1993 import figure includes an additional estimate for unrecorded trade.

(4) 2008 is 4 days longer than the standard 52 week statistical reporting period (SRP) for January to December 2008. This is to enable a smooth transition to publishing data on a calendar month basis from January 2009 rather than 4 and 5 week SRPs used for previous years.

2.1.2 Inland consumption of solid fuels 1970 to 2008⁽⁴⁾

Thousand tonnes													
Total inland consumption of coal	Coal consumption by fuel producers						Final consumption						
	Primary		Secondary				Coal (1)			Coke and breeze (2)	Other solid fuel (3)		
	Collieries	Power stations (1)	Coke ovens and blast furnaces	Other solid fuel plants (3)	Gas works	Total	Industry	Domestic	Other			Total	
1970	156,886	1,916	77,237	25,340	4,150	4,280	111,006	19,613	20,190	4,159	43,962	18,090	3,203
1971	140,932	1,581	72,847	23,554	4,477	1,855	102,733	16,105	17,185	3,327	36,617	15,100	3,456
1972	122,884	1,405	66,664	20,476	4,547	575	92,261	11,663	14,554	2,999	29,216	14,090	3,514
1973	133,370	1,381	76,838	21,888	3,607	512	102,845	12,062	14,502	2,581	29,145	15,000	3,375
1974	117,888	1,256	67,026	18,461	3,788	107	89,382	11,077	13,667	2,505	27,249	13,220	3,184
1975	122,217	1,238	74,569	19,085	4,063	9	97,725	9,685	11,616	1,948	23,253	11,640	2,919
1976	123,604	1,132	77,819	19,402	3,405	8	100,632	8,970	10,823	2,045	21,838	12,460	2,647
1977	123,978	1,124	79,956	17,406	3,173	-	100,536	9,033	11,136	2,149	22,318	11,310	2,609
1978	120,477	1,010	80,643	14,946	3,070	-	98,659	8,550	10,217	2,041	20,808	10,484	2,453
1979	129,378	834	88,790	15,081	2,883	-	106,753	9,232	10,508	2,051	21,791	11,361	2,364
1980	123,460	663	89,569	11,610	3,022	-	104,201	7,898	8,946	1,752	18,596	6,221	2,252
1981	118,386	616	87,226	10,805	2,458	-	100,489	7,046	8,454	1,781	17,281	7,952	1,975
1982	110,998	534	80,228	10,406	2,326	-	92,960	7,175	8,474	1,855	17,504	7,248	1,921
1983	111,475	486	81,565	10,448	2,114	-	94,127	7,218	7,872	1,772	16,862	7,600	1,889
1984	77,309	209	53,411	8,246	1,300	-	62,957	7,006	5,406	1,731	14,143	7,653	1,186
1985	105,386	332	73,940	11,122	2,176	-	87,237	8,313	7,799	1,704	17,817	8,230	1,658
1986	114,234	306	82,652	11,122	1,959	-	95,732	9,278	7,421	1,496	18,196	7,558	1,601
1987	115,894	235	87,960	10,859	2,052	-	100,871	6,827	6,536	1,425	14,789	8,233	1,652
1988	111,498	196	84,258	10,902	2,006	-	97,166	7,131	5,741	1,265	14,135	8,591	1,443
1989	107,581	146	82,053	10,792	1,717	-	94,562	6,763	5,048	1,062	12,873	8,159	1,253
1990	108,256	117	84,014	10,852	1,544	-	96,409	6,280	4,239	1,211	11,730	7,637	1,214
1991	107,513	112	83,542	10,011	1,501	-	95,054	6,426	4,778	1,144	12,348	7,136	1,200
1992	100,580	79	78,469	9,031	1,319	-	88,819	6,581	4,156	945	11,682	6,887	1,089
1993	86,757	48	66,136	8,479	1,329	-	75,944	5,300	4,638	826	10,765	6,638	1,138
1994	81,767	22	62,406	8,581	1,190	-	72,177	4,946	3,901	721	9,568	6,578	949
1995	76,942	8	59,588	8,657	982	-	69,227	4,494	2,690	523	7,707	6,541	742
1996	71,400	8	55,511	8,632	946	-	65,089	3,075	2,705	523	6,303	6,925	835
1997	63,080	8	47,333	8,750	864	-	56,947	2,993	2,587	545	6,125	6,784	616
1998	63,152	5	48,588	8,728	635	-	57,951	2,414	2,366	416	5,196	6,545	630
1999	55,724	10	41,827	8,413	646	-	50,886	2,040	2,517	271	4,828	6,705	572
2000	59,931	12	46,853	8,685	540	-	56,078	1,876	1,883	82	3,841	6,301	521
2001	63,850	10	51,681	7,895	496	-	60,072	1,826	1,874	68	3,768	5,473	483
2002	58,554	9	48,458	6,533	436	-	55,427	1,810	1,286	22	3,118	4,715	414
2003	63,023	6	53,086	6,611	396	-	60,093	1,856	1,043	25	2,923	5,337	358
2004	60,450	8	50,917	6,382	327	-	57,626	1,848	941	28	2,817	5,146	316
2005	61,832	6	52,517	6,609	266	-	59,395	1,781	614	49	2,445	5,016	256
2006	67,522r	4	57,895r	7,049	276	-	65,106r	1,703r	559r	36	2,298r	5,262r	257
2007	62,932r	5	52,971r	7,175	245	-	60,453r	1,862r	648	26	2,536r	5,253r	235r
2008	58,212	5	48,259	7,045	317	-	55,621	1,872	684	29	2,586	5,104	294

(1) Up to 1986 power stations include those in the public electricity supply, railways and transport industries. Consumption by other generators is included in final coal consumption. From 1987, coal consumption at power stations also includes other generators' consumption, which is therefore excluded from final coal consumption (see also Table 2.7). From 1999 includes coal consumption for heat sold to third parties.

(2) This series comprises final consumption and consumption at blast furnaces which can now be separated following production of energy balances in Tables 2.4 to 2.6 of the main Digest. Pure final consumption figures for coke and breeze in 2004, 2005, 2006, 2007 and 2008 were 976, 948, 829, 861 and 741 thousand tonnes respectively.

(3) Low temperature carbonisation and patent fuel plants and their products.

(4) 2008 is 4 days longer than the standard 52 week statistical reporting period (SRP) for January to December 2008. This is to enable a smooth transition to publishing data on a calendar month basis from January 2009 rather than 4 and 5 week SRPs used for previous years.

Chapter 3: Long term trends

Petroleum

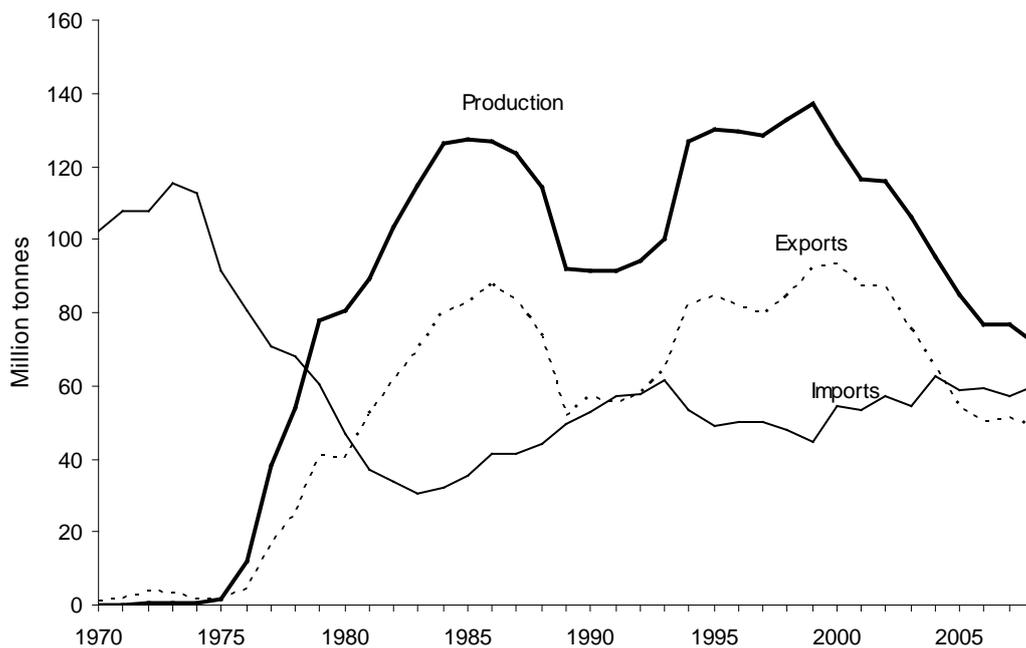
3.1.1 Tables 3.1.1 and 3.1.2 present extended time series of selected, more aggregated data, from the tables in Chapter 3 of the main Digest. They give additional background on the historic development of the crude oil and petroleum sectors.

Crude oil and petroleum products: production, imports and exports (Table 3.1.1)

3.1.2 The left-hand side of Table 3.1.1 shows data from 1970 to 2008 for production, imports and exports of crude oil (including natural gas liquids and feedstocks) and oil products. This part of the table also shows United Kingdom refinery throughput of crude oil, and the inland deliveries of oil products. Indigenous production of crude oil is shown in total with landward production shown separately.

3.1.3 The first three columns of the right-hand side of Table 3.1.1 consist of time series showing net exports of crude oil and products. It should be noted that exports of crude oil include some imports that have been re-exported. In years of significant indigenous production these have little effect on exports as a proportion of indigenous production, but in the earlier years (approximately pre-1975) the re-exports exceeded indigenous production and thus the ratio of exports to indigenous production was greater than one.

Chart 3.1.1: Production, exports and imports of oil⁽¹⁾ 1970 to 2008



(1) Includes crude oil, natural gas liquids and process oils.

3.1.4 Chart 3.1.1 illustrates the trends in the production, exports and imports of crude oil. It shows that indigenous production of crude oil was negligible up to 1974 and then increased rapidly as North Sea production came on stream. Imports peaked in 1973, immediately prior to the first OPEC price 'hike'. The chart shows the rapid decline of net imports thereafter as indigenous production rose, until 1981 when the surplus turned from net imports to net exports. Net exports first peaked in 1986, one year after the first peak for North Sea production in 1985.

3.1.5 The large fall in production in 1988 and particularly 1989 reflects the effects of the Piper Alpha disaster and subsequent incidents, and the continued 'low' production in 1990 and 1991 reflects the consequent safety work. Production has been declining since the peak production of 137 million tonnes in 1999. In 2008 production was 5 million tonnes lower than 2007. More information on the reasons behind this reduction can be found in Annex F, paragraph F.9.

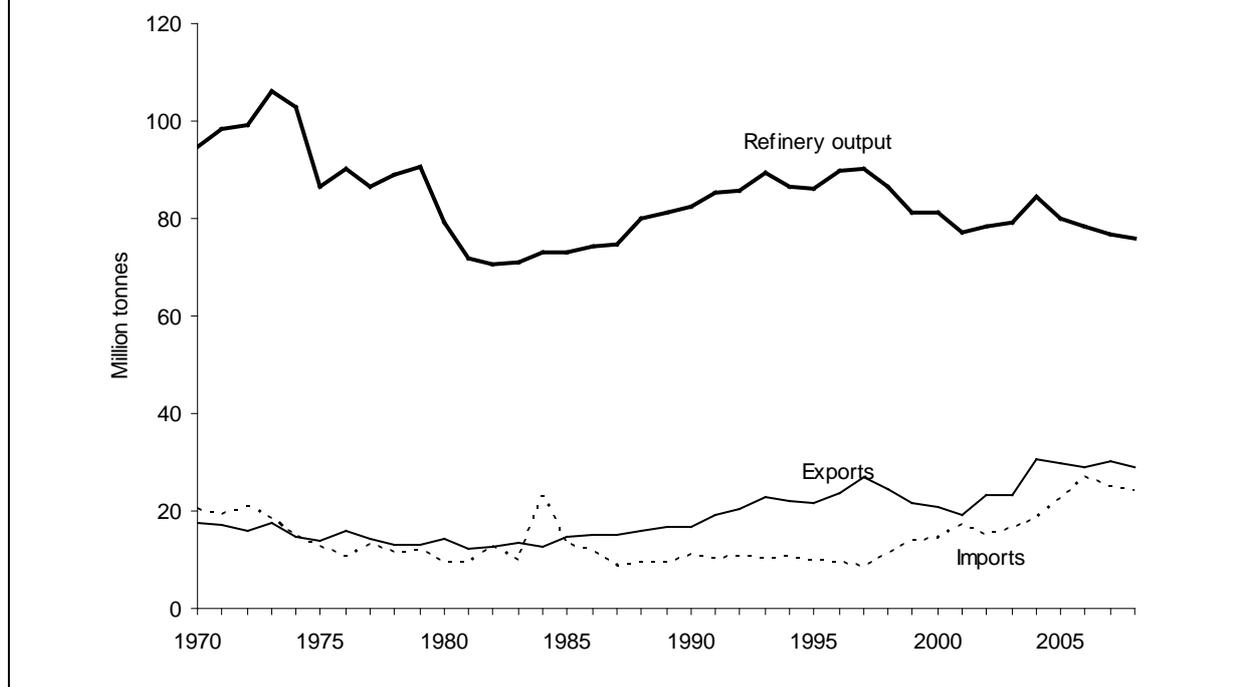
3.1.6 Table 3.1.1 also shows that the import share of refinery throughput of crude oil fell from nearly 100 per cent, prior to North Sea oil production starting, to a low of 39 per cent in 1983 (the lowest year for imports), before rising to 64 per cent in 1993. Since then, indigenous production has increased significantly leading to the import share falling to 51 per cent in 1999, the year of record UK production of crude oil. The imports' share has since risen to 74 per cent in 2008 due to the lower levels of production mentioned above. These developments are mirrored by the changes in the ratio of indigenous production to refinery throughput. Ignoring pre-1976 figures, the proportion of indigenous production exported increased from 35 per cent in 1976 to around two-thirds towards the end of the 1980s. Although the decreases in production in the late 1980s did lead to some reduction in the level of exports, the proportion of production exported continued at roughly this level during the 1990s. Since 2000, however, the proportion has risen to about two thirds.

3.1.7 In 1984 the UK was a net importer of oil products due to the increased demand for oil products as a result of the miners strike. Since 1984 the UK has been a net exporter of oil products with increases in exports during the 1990s leading to a record high in 1997. The increases in net exports of products in the 1990s reflect the increased throughput from refineries mainly feeding through to increased exports of oil products, rather than increases in deliveries to the domestic market. Net exports of products decreased in both 1998 and 1999, (following the closure of the Gulf Oil refinery from December 1997). The closure of the Shell Haven refinery was the main reason for the decline in net exports of products in 2000. The sharp fall in 2001 occurred due to a number of prolonged shutdowns and slowdowns at refineries in the first half of the year to allow upgrade work for the introduction of ultra low sulphur petrol. Imports of crude oil in 1991 (and marginally again in 1992) exceeded exports for the first time since 1980. Net exports of crude oil resumed in 1993, and continued to rise until 1999. In 1999 net exports of crude oil were 47 million tonnes at their highest since 1984 with overall net exports of crude oil and oil products at a record level of almost 55 million tonnes. However, the decreased level of crude oil production since 1999 has seen net exports of crude oil falling over the last six years and the UK becoming a net-importer of primary oils in 2005 for the first time since 1992. This has continued into 2008 on a greater scale. In 2008 the UK was a net-importer of primary oils and a net-exporter of oil products, however, the extent of importing was on a large enough scale that overall, for both primary oils and oil products combined the UK was a net-importer.

3.1.8 Refinery throughput peaked in 1973 but subsequently fell to pre-1970 levels together with refinery output. (The difference between refinery throughput and output is refinery use of fuel and gains/losses). Since the low point of 1982/83, both refinery throughput and output increased to a new peak in 1997. However, with the closure of the Gulf Oil refinery in late 1997, refinery output fell by 4 per cent in 1998 and then by another 6 per cent in 1999 to the lowest level seen since 1989. However, the remaining refineries in the UK worked to increase their capacity and utilisation rates and to a large extent offset the closures of the Gulf Oil and Shell Haven refineries. The fall in refinery output in 2001 is the result of the shutdowns mentioned above. In 2008 refinery output stood at 76 million tonnes, 1 per cent lower than in 2007 and 3 per cent lower than in 2006.

3.1.9 Exports of oil products increased from 1991 to 1993 (comfortably exceeding the earlier peak at the beginning of the 1970s), fell in 1994 and 1995 before climbing again to reach a new peak in 1997 at 26.8 million tonnes. Imports of oil products were at their highest in 1967 and, apart from a 'blip' in 1984 as a result of the miners' strike, have been less than half this peak in recent years. As a result, 1984 apart, exports of oil products have exceeded imports in every year since 1974. In 2008 imports made up 34 per cent of inland deliveries, comparable to the levels of the early 1970s. Chart 3.1.2 summarises the trend in refinery output, exports and imports of oil products over the period.

Chart 3.1.2: Refinery output, exports and imports of oil products 1970 to 2008



Inland deliveries of petroleum products (Table 3.1.2)

3.1.10 Table 3.1.2 shows data for deliveries of petroleum products from 1970 to 2008, split between non-energy uses in total and the major products delivered for energy use. While data for deliveries are considered to be a good proxy for consumption, differences can occur mainly due to stock changes along the chain of consumption. Total deliveries for energy use shown in the first (left-hand) half of the table and include 'own use' by refineries that are separately identified in the right-hand part of the table.

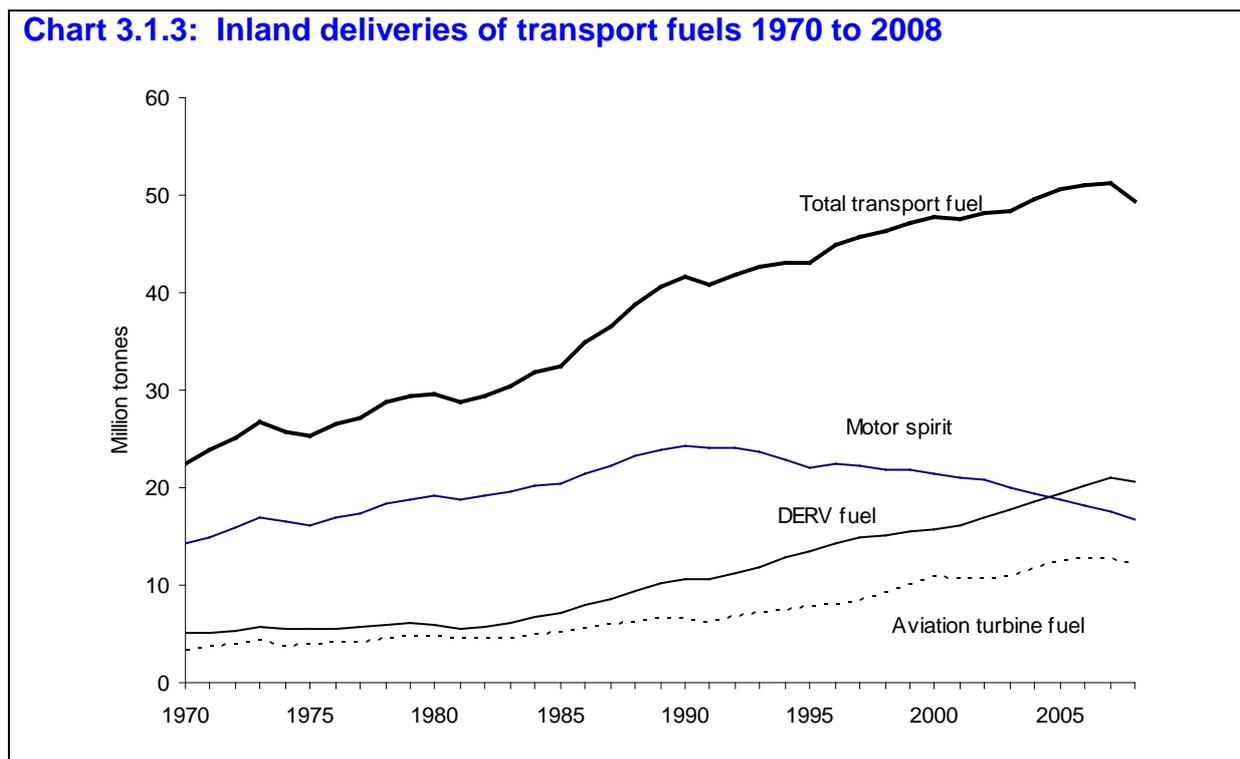
3.1.11 Deliveries of petroleum products peaked in 1973, in common with other aggregate oil figures (see Table 3.1.1). The 'blip' in 1984 reflects the increased deliveries (of fuel oil in particular) during the miners' strike. Fuel oil deliveries are now 8 per cent of their level in 1970 while gas oil deliveries (excluding DERV fuel) are half their 1970 level. In contrast, deliveries of aviation turbine fuel have grown continuously throughout the period. After limited growth during the 1970s and early 1980s, deliveries of DERV fuel resumed the high growth rates apparent in the 1960s, and have increased by a quarter over the last 10 years. The upward surge of deliveries of transport fuels slowed in 1990 and ceased in 1991 with the twin impacts of the Gulf crisis and recession, with some recovery being seen in 1992.

3.1.12 Since 1992, motor spirit deliveries have declined each year, with the exception of 1996 which saw deliveries 2 per cent higher than in 1995. In 2008 deliveries of motor spirit were 24 per cent lower than in 1998. These changes reflect the switch to diesel-engine cars and are mirrored by the consistent pattern of increases in deliveries of DERV fuel each year since 1990. In 2005, deliveries of DERV fuel exceeded motor spirit in mass terms for the first time, and in 2007 DERV deliveries surpassed motor spirit in terms of both mass and volume, which has continued into 2008. Deliveries of DERV fuel in 2008 were 94 per cent higher than in 1990. Deliveries of aviation turbine fuel also increased each year from 1992 to 2000. However deliveries of aviation turbine fuel fell in 2001 due to the terrorist attacks on the United States on 11th September 2001 that caused a downturn in the global aviation industry. Developments in Afghanistan and Iraq during 2002 also impacted on the aviation industry with deliveries of aviation turbine fuel in 2002 being 1 per cent lower than in 2001, although deliveries have since recovered slightly by remaining virtually unchanged when compared to 2007. Deliveries of aviation turbine fuel have increased by 84 per cent between 1990 and 2008. Chart 3.1.3 shows the trends in deliveries of transport fuels from 1970 to 2008.

3.1.13 By the end of the 1980s and during the 1990s deliveries for non-energy uses were not far off their peak of the early to mid-1970s. Non-energy use has declined steadily in recent years, and is down almost 20 per cent on the most recent peak, in 2004.

3.1.14 The right hand columns of Table 3.1.2 (headed “Energy industry use” and “Final users”) show a sector-by-sector breakdown of the total deliveries for energy use given in the left hand columns. Fuels used in blast furnaces are included in the “other energy industry uses” column rather than in the iron and steel column. Total uses by the transport industry are now more than double the amount delivered in 1970 as Chart 3.1.3 shows. Deliveries to every other major sector are below 1973 levels - well below for electricity generators, iron and steel and ‘other industries’, and other final users (mainly agriculture, public administration and commerce).

Chart 3.1.3: Inland deliveries of transport fuels 1970 to 2008



3.1.15 Additional analysis to that presented in this publication has been conducted on the information provided in Tables 3.1.1 and 3.1.2. The main purpose of this analysis was to extend the information provided back as far as possible, which has meant back to 1870 for some information. An article containing this analysis was published in the March 2007 edition of Energy Trends which is available on the internet at:

www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx

3.1.1 Crude oil and petroleum products: production, imports and exports⁽¹⁾⁽²⁾ 1970 to 2008

	Thousand tonnes								
	Crude oil (3)					Oil products			
	Imports	Indigenous production		Exports	Refinery throughput	Refinery output (4)	Exports	Imports	Inland deliveries (4)
		Total	Landward						
1970	102,155	156	83	1,182	101,911	94,696	17,424	20,428	91,151
1971	107,736	212	85	1,569	105,342	98,245	17,166	19,369	91,991
1972	107,706	333	85	3,558	106,980	99,368	15,979	20,827	98,469
1973	115,472	372	88	3,235	114,338	105,954	17,404	18,300	99,786
1974	112,822	410	107	1,404	111,217	103,060	14,631	14,537	93,409
1975	91,366	1,564	99	1,524	93,597	86,647	13,924	12,786	82,824
1976	80,466	12,169	99	4,285	97,784	90,284	15,988	10,709	81,579
1977	70,697	38,265	99	16,793	93,615	86,338	14,160	13,050	82,759
1978	68,144	54,006	88	25,200	96,390	89,156	13,194	11,586	84,141
1979	60,380	77,748	121	40,569	97,806	90,583	12,988	12,035	84,554
1980	46,717	80,467	237	40,180	86,341	79,227	14,110	9,245	71,177
1981	36,855	89,454	232	52,206	78,287	72,006	12,256	9,402	66,256
1982	33,754	103,211	253	61,670	77,130	70,747	12,637	12,524	67,246
1983	30,324	114,960	316	69,923	76,876	70,927	13,331	9,907	64,464
1984	32,272	126,065	345	80,143	79,117	73,187	12,478	23,082	81,435
1985	35,576	127,611	380	82,980	78,431	72,904	14,828	13,101	69,781
1986	41,209	127,068	504	87,437	80,155	74,089	15,283	11,767	69,227
1987	41,541	123,351	578	83,220	80,449	74,656	14,980	8,570	67,701
1988	44,272	114,459	761	73,330	85,662	79,837	15,802	9,219	72,317
1989	49,500	91,710	722	51,664	87,669	81,392	16,683	9,479	73,028
1990	52,710	91,604	1,758	56,999	88,692	82,286	16,899	11,005	73,943
1991	57,084	91,261	3,703	55,131	92,001	85,476	19,351	10,140	74,506
1992	57,683	94,251	3,962	57,627	92,334	85,783	20,250	10,567	75,470
1993	61,701	100,189	3,737	64,415	96,273	89,584	23,031	10,064	75,790
1994	53,096	126,542	4,649	82,393	93,161	86,644	22,156	10,441	74,957
1995	48,749	129,894	5,051	84,577	92,743	86,133	21,614	9,878	73,694
1996	50,099	129,742	5,251	81,563	96,660	89,885	23,681	9,315	75,390
1997	49,994	128,234	4,981	79,400	97,023	90,366	26,755	8,706	72,501
1998	47,958	132,633	5,161	84,610	93,797	86,615	24,375	11,418	72,261
1999	44,869	137,099	4,285	91,797	88,286	81,195	21,730	13,896	72,436
2000	54,386	126,245	3,247	92,917	88,013	81,130	20,677	14,212	71,944
2001	53,551	116,678	2,921	86,930	83,343	77,051	19,088	17,234	71,354
2002	56,968	115,944	2,673	87,144	84,784	78,319	23,444	14,900	70,557
2003	54,177	106,073	2,198	74,898	84,585	79,073	23,323	16,472	71,697
2004	62,517	95,374	1,938	64,504	89,821	84,411	30,495	18,545	73,649
2005	58,885	84,721	1,648	54,099	86,134	80,162	29,722	22,512	75,134
2006	59,443	76,578	1,380	50,195	83,213	78,200	29,009	26,828	75,110
2007	57,357	76,575	1,271	50,999	81,117	76,788	30,017	25,093	73,234
2008	60,074	71,665	1,248	48,410	80,725	75,903	28,811	23,916	71,420

(1) Aggregate monthly data on crude oil production and trade in oil and oil products are available - see Chapter 3 paragraph 3.97 and Annex C.

(2) See paragraphs 3.1.2 to 3.1.9.

(3) Includes natural gas liquids and feedstocks.

(4) Excludes products used as fuels within refinery processes.

3.1.1 Crude oil and petroleum products: production, imports and exports⁽¹⁾⁽²⁾ 1970 to 2008 (continued)

Net exports			Crude oil			Oil products	
Crude oil (5)	Oil products (5)	Total (5)	Ratio of imports to ref. throughput	Ratio of indigenous production to ref. throughput	Ratio of exports to indigenous production	Imports: Share of inland deliveries	
Thousand tonnes			Ratio			Percentage	
-100,973	-3,004	-103,977	1.002	0.001	7.577	22.4	1970
-106,167	-2,203	-108,370	1.023	0.001	7.401	21.1	1971
-104,148	-4,848	-108,996	1.007	0.002	10.685	21.2	1972
-112,237	-896	-113,133	1.010	0.002	8.696	18.3	1973
-111,418	94	-111,324	1.014	0.002	3.424	15.6	1974
-89,842	1,138	-88,704	0.976	0.012	0.974	15.4	1975
-86,181	5,279	-80,902	0.925	0.118	0.352	13.1	1976
-53,904	1,110	-52,794	0.755	0.409	0.439	15.8	1977
-42,944	1,608	-41,336	0.707	0.560	0.467	13.8	1978
-19,811	953	-18,858	0.617	0.796	0.522	14.2	1979
-6,537	4,865	-1,672	0.541	0.932	0.499	13.0	1980
15,351	2,854	18,205	0.471	1.143	0.583	14.2	1981
27,916	113	28,029	0.438	1.338	0.597	18.6	1982
39,599	3,424	43,023	0.394	1.497	0.608	15.4	1983
48,141	-10,604	37,537	0.408	1.593	0.638	28.3	1984
47,404	1,727	49,131	0.454	1.627	0.650	18.8	1985
46,228	3,516	49,744	0.514	1.585	0.688	17.0	1986
41,679	6,410	48,089	0.516	1.533	0.675	12.7	1987
29,057	6,583	35,640	0.517	1.336	0.641	12.7	1988
2,164	7,204	9,368	0.565	1.046	0.563	13.0	1989
4,289	5,894	10,183	0.594	1.033	0.622	14.9	1990
-1,953	9,211	7,258	0.620	0.992	0.604	13.6	1991
-56	9,683	9,627	0.625	1.021	0.611	14.0	1992
2,714	12,967	15,681	0.641	1.041	0.643	13.3	1993
29,297	11,715	41,012	0.570	1.359	0.651	13.9	1994
35,828	11,736	47,564	0.526	1.401	0.651	13.4	1995
31,464	14,366	45,830	0.518	1.342	0.629	12.1	1996
29,406	18,037	47,443	0.515	1.322	0.619	12.0	1997
36,652	12,957	49,609	0.511	1.414	0.638	15.8	1998
46,928	7,834	54,762	0.508	1.553	0.670	19.2	1999
38,531	6,464	44,995	0.618	1.434	0.736	19.8	2000
33,378	1,854	35,232	0.643	1.400	0.745	24.2	2001
30,176	8,544	38,720	0.672	1.368	0.752	21.1	2002
20,720	6,851	27,571	0.641	1.254	0.706	23.0	2003
1,987	11,950	13,937	0.696	1.062	0.676	25.2	2004
-4,786	7,210	2,423	0.684	0.984	0.639	30.0	2005
-9,249	2,181	-7,067	0.714	0.920	0.655	35.7	2006
-6,357	4,924	-1,433	0.707	0.944	0.666	34.3	2007
-11,665	4,894	-6,770	0.744	0.888	0.676	33.5	2008

(5) A minus (-) signifies that in that particular year imports were greater than exports.

Chapter 4: Long term trends

Gas

Natural gas and colliery methane production and consumption (Table 4.1.1)

4.1.1 Table 4.1.1 shows data for production, imports, exports, and the consumption of natural gas and colliery methane by major sector in each year from 1970 to 2008. Separate figures are shown for consumption of town gas and methane.

4.1.2 Total consumption in Table 4.1.1 is defined to match the definition of gas consumption used in the gas tables before the 1999 Digest. This enables a consistent long term series to be presented. In 2008, total consumption of natural gas and colliery methane in this table is related to total UK consumption of natural gas in Table 4.3 of Chapter 4 of the main Digest as follows:

	GWh
Total consumption (Table 4.1.1)	1,077,003
<i>less</i> Colliery methane	<u>- 635</u>
<i>equals</i>	
Total consumption of natural gas	1,076,368
<i>less</i> Producers' own use	- 62,231
<i>less</i> Operators' own use	<u>- 4,265</u>
<i>equals</i>	
Total UK consumption (Table 4.3)	1,009,873

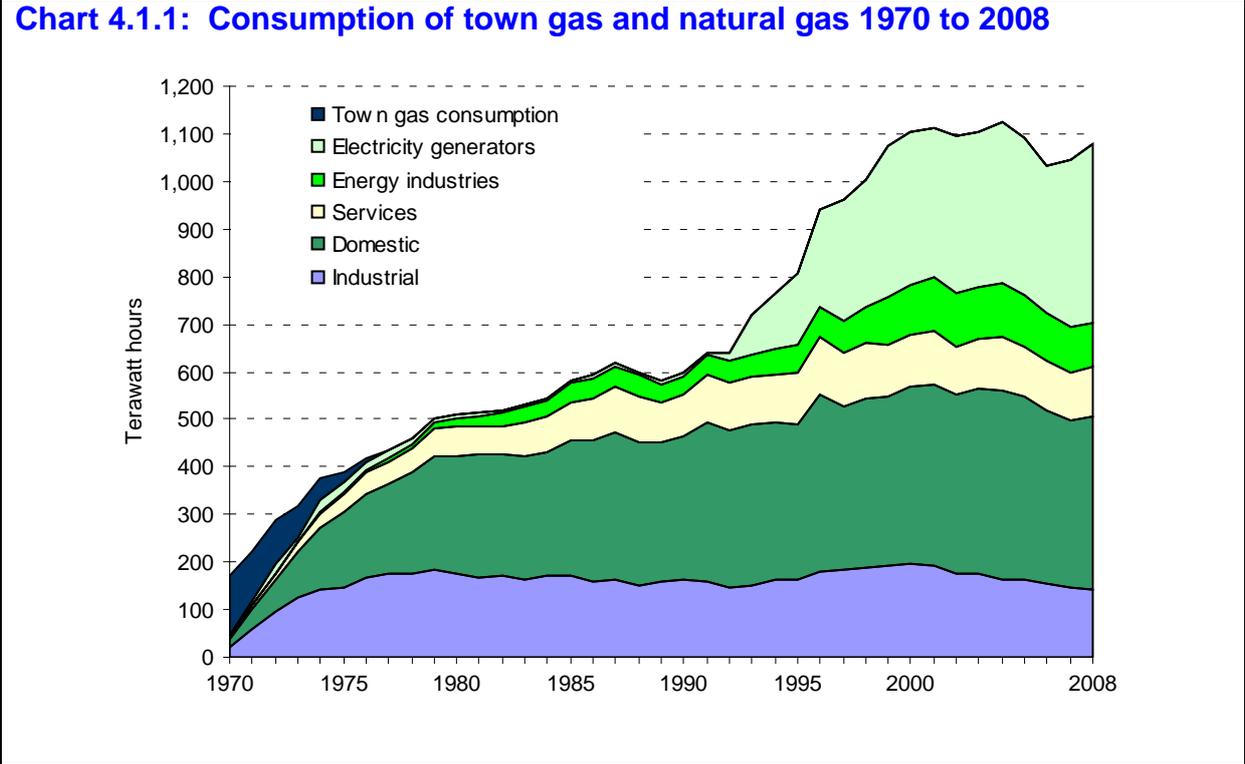
Paragraph 4.23 of Chapter 4 of the main Digest shows how natural gas consumption in Table 4.3 relates to total demand in the balances Tables 4.1 and 4.2.

4.1.3 Chart 4.1.1 illustrates the data in Table 4.1.1. It shows how the supply of natural gas became established during the first part of the 1970s and the decline of town gas to zero by the middle of that decade. Thereafter, the supply of natural gas continued to grow less rapidly, with indigenous production bolstered from 1977 by increasing imports from the Norwegian sector of the North Sea. By 1998 imports had fallen to only 7 per cent of their peak in the mid-1980s. This was not only due to the depletion of the (mainly Norwegian) Frigg field (which ceased production in October 2004), but also resulted from the resurgence of UK production, which achieved a new record each year from 1989 to 2000. Since 2000, UK production has fallen by just over a third, as UK reserves deplete. 1992 saw the first exports of natural gas from the United Kingdom's share of the Markham gas field to the Netherlands. In 1995, these were supplemented by the first exports to the Republic of Ireland, followed by the start of gas exports from the Windermere field via the Markham field during 1997, and exports via the UK-Belgium interconnector during 1998. By 2000, exports were almost six times the volume of imports. In October 2001, new gas supplies began to arrive from the Norwegian sector of the North Sea via the newly commissioned Vesterled pipeline. In December 2003 imports recommenced from the UK/Norway trans-median line Statfjord field. These additional supplies of gas from the Norwegian sector of the North Sea saw the UK become a net importer of gas in 2004 for the first time since 1996. In 2005, imports of liquefied natural gas (LNG) via the Isle of Grain import/storage facility began increasing UK net imports. In October 2006, the first gas flowed through the Langeled pipeline giving the UK additional access to Norwegian gas fields. Also in October 2006, the compressors at Zeebrugge were upgraded increasing the import capacity through UK-Belgium interconnector. In December 2006, a second interconnector from Balgzand in the Netherlands to Bacton gave the UK access to the Dutch Continental Shelf. In 2007 two new fields, Grove and Minke, joined Markham and Windermere in exporting gas directly to the Netherlands. 2007 also saw gas exports to Norway, ie UK gas from the Blane field to the Norwegian Ula field for injection into the Ula reservoir. In 2008 additional direct exports of gas to the Netherlands began from the new Chiswick field. In 2008, net imports of gas accounted for 26 per cent of natural gas available for inland consumption, compared with 21 per cent in 2007.

4.1.4 Table 4.1.1 also shows that the bulk of the rapid growth in the 1970s in consumption of natural gas was in the domestic and industrial sectors. In the 1980s and early 1990s, there was a fall in industrial use. However, gas consumption by industry was on an upward trend from 1992 to 2000,

when it exceeded the previous peak of 1985 by 14 per cent. Since then, industrial use of gas has fallen back, and in 2008 was 28 per cent lower than in 2000. Between 1980 and 2008, there was a 75 per cent increase in gas consumption by the service sector, which for this table is defined as including public administration, commercial activities and agriculture, although in its peak year, 1996, service sector consumption was 95 per cent higher than in 1980. In 2008, domestic sector gas consumption was 47 per cent higher than its 1980 level, but 8 per cent lower than the peak in 2004. The increase in total consumption accelerated in the early 1990s because of the large increase in consumption by electricity generators, as Chart 4.1.1 illustrates. However, even if consumption by electricity generators is excluded, consumption of natural gas in 2008 was 39 per cent up on its level in 1980.

Chart 4.1.1: Consumption of town gas and natural gas 1970 to 2008



4.1.5 A more detailed examination of historical gas statistics was published in the December 2001 issue of Energy Trends. This looked at trends since 1882 in gas production, gas consumption and fuel used in the past to manufacture gas. The updated data set on which the article is based includes data for 2008 and is available on the DECC web site at:

www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx

The original article is to be found at: www.berr.gov.uk/files/file30456.pdf (on page 34)

4.1.1 Natural gas and colliery methane production and consumption 1970 to 2008

GWh									
	Production		Imports	Exports	Total for consumption			Domestic	
	Town gas (1)	Methane (2)	Methane (3)	Methane	Total	Town gas	Methane (2)	Town gas	Methane
1970	49,617	121,712	9,759	-	171,564	125,933	45,631	85,430	18,376
1971	24,882	201,721	9,730	-	222,616	104,245	118,371	73,502	41,675
1972	17,848	291,078	8,968	-	290,287	95,834	194,453	64,974	67,172
1973	21,336	317,132	8,587	-	319,917	68,286	251,631	46,598	94,515
1974	12,221	382,253	7,122	-	377,388	44,840	332,548	30,450	127,339
1975	5,393	397,932	9,818	-	391,250	20,984	370,237	14,507	158,141
1976	1,700	421,700	11,254	-	417,655	6,272	411,120	4,250	177,279
1977	762	440,544	19,548	-	436,793	2,051	434,742	1,290	191,844
1978	615	422,257	55,361	-	460,297	938	459,359	557	212,242
1979	674	425,832	95,424	-	502,382	1,055	501,327	586	240,465
				-					
1980	586	404,760	116,291	-	508,684	909	507,775	557	246,766
1981	557	401,742	124,262	-	512,112	791	511,321	469	256,379
1982	557	405,815	115,001	-	518,149	674	517,475	410	255,118
1983	586	416,454	124,497	-	528,642	528	528,114	322	259,661
1984	557	414,314	147,415	-	544,584	498	544,086	293	261,507
1985	498	461,851	147,122	-	581,717	469	581,248	293	283,517
1986	440	483,040	137,099	-	588,691	410	588,281	234	299,929
1987 (4)	322	508,126	128,893	-	614,247	322	613,925	147	307,578
1988	88	489,133	115,441	-	594,766	88	594,678	29	300,515
1989	-	478,931	113,770	-	580,522	-	580,522	-	290,557
				-					
1990	-	528,843	79,833	-	597,046	-	597,046	-	300,410
1991	-	588,822	72,007	-	641,763	-	641,763	-	333,963
1992	-	598,761	61,255	620	640,818	-	640,818	-	330,101
1993	-	703,971	48,528	6,824	717,357	-	717,357	-	340,162
1994	-	751,588	33,053	9,557	764,667	-	764,667	-	329,710
1995	-	823,336	19,457	11,232	808,786	-	808,786	-	326,010
1996	-	979,019	19,804	15,203	938,848	-	938,848	-	375,841
1997	-	998,871	14,062	21,666	960,243	-	960,243	-	345,532
1998	-	1,048,859	10,582	31,604	1,005,306	-	1,005,306	-	355,895
1999	-	1,152,635	12,862	84,433	1,072,963	-	1,072,963	-	358,066
2000	-	1,260,656	26,032	146,342	1,105,537	-	1,105,537	-	369,909
2001	-	1,231,263	30,464	138,330	1,111,729	-	1,111,729	-	379,426
2002	-	1,205,405	60,493	150,731	1,096,267	-	1,096,267	-	376,372
2003	-	1,197,030	86,298	177,039	1,102,774	-	1,102,774	-	386,486
2004	-	1,121,257	133,033	114,112	1,124,996	-	1,124,996	-	396,411
2005	-	1,025,989	173,328	96,181	1,090,291	-	1,090,291	-	384,009
2006	-	930,538	244,029	120,591	1,033,439r	-	1,033,439r	-	365,850r
2007	-	838,809	338,026r	123,158	1,046,067r	-	1,046,067r	-	352,943r
2008	-	810,284	407,054	122,670	1,077,003	-	1,077,003	-	363,315

(1) In most years production of town gas is less than consumption because of transfers into town gas of North Sea and imported methane.

(2) Includes colliery methane.

(3) Before 1977 imports were of liquefied natural gas. These imports continued until the early 1980s.

(4) From 1987 data for industrial use of gas exclude gas used for electricity generation within industry (see Chapter 1, paragraph 1.25).

4.1.1 Natural gas and colliery methane production and consumption 1970 to 2008 (continued)

Analysis of consumption							GWh
Industrial (5)		Electricity generators	Other energy industries (6)		Services (7)		
Town gas	Methane (2)	Methane (2)	Town gas (8)	Methane (2)	Town gas	Methane	
20,691	20,808	1,858	-	1,160	19,812	3,428	1970
12,075	60,431	7,808	-	926	18,669	7,531	1971
13,423	94,662	18,563	-	633	17,438	13,423	1972
9,173	125,552	8,453	-	2,743	12,514	20,369	1973
5,744	143,341	28,967	-	3,094	8,646	29,806	1974
2,579	146,067	25,245	-	3,241	3,898	37,542	1975
791	165,644	19,501	-	3,563	1,231	45,132	1976
352	173,820	15,310	-	7,637	410	46,131	1977
176	176,253	10,006	-	9,952	205	50,906	1978
205	182,232	7,104	-	14,143	264	57,382	1979
-	-	-	-	-	-	-	-
147	177,513	4,027	-	19,096	205	60,373	1980
147	168,574	4,174	-	22,320	176	59,874	1981
88	169,717	3,793	-	26,657	176	62,190	1982
59	163,123	2,357	-	30,819	147	72,154	1983
59	170,831	5,317	-	33,193	147	73,238	1984
29	172,941	5,873	-	41,135	147	77,781	1985
29	157,496	2,269	-	43,421	147	85,166	1986
29	164,442	2,415	-	43,743	147	95,746	1987 (4)
-	149,935	2,407	-	44,109	59	97,712	1988
-	159,701	6,210	-	37,850	-	86,204	1989
-	-	-	-	-	-	-	-
-	164,595	6,513	-	39,159	-	86,369	1990
-	157,932	6,650	-	41,472	-	101,746	1991
-	147,218	17,969	-	45,660	-	99,871	1992
-	148,522	81,848	-	47,006	-	99,819	1993
-	161,815	117,606	-	54,700	-	100,836	1994
-	162,797	154,393	-	56,565	-	109,020	1995
-	177,794	201,969	-	65,336	-	117,908	1996
-	182,867	251,822	-	67,245	-	112,777	1997
-	188,595	267,733	-	75,459	-	117,624	1998
-	190,415	315,493	-	102,502	-	106,487	1999
-	-	-	-	-	-	-	-
-	198,506	324,563	-	102,103	-	110,456	2000
-	191,600	312,939	-	114,653	-	113,111	2001
-	176,168	329,847	-	113,047	-	100,833	2002
-	176,778	324,580	-	108,197	-	106,733	2003
-	164,702	340,824	-	109,584	-	113,475	2004
-	162,010	328,960	-	107,820	-	107,491	2005
-	154,258r	309,505r	-	100,652r	-	103,174r	2006
-	146,208r	352,737r	-	94,450r	-	99,730r	2007
-	142,492	374,084	-	91,639	-	105,473	2008

(5) Industrial consumption in Chapter 4, Tables 4.1 and 4.2 plus use in coke manufacture and blast furnaces and non energy gas use.

(6) Energy industry use in Chapter 4, Tables 4.1 and 4.2 less use in coke manufacture and blast furnaces plus gas transferred to heat for sale.

(7) Public administration, commercial, agriculture and miscellaneous in Chapter 4, Tables 4.1 and 4.2.

(8) Town gas consumption by the energy industries is included with the industrial sector.

Chapter 5: Long term trends

Electricity

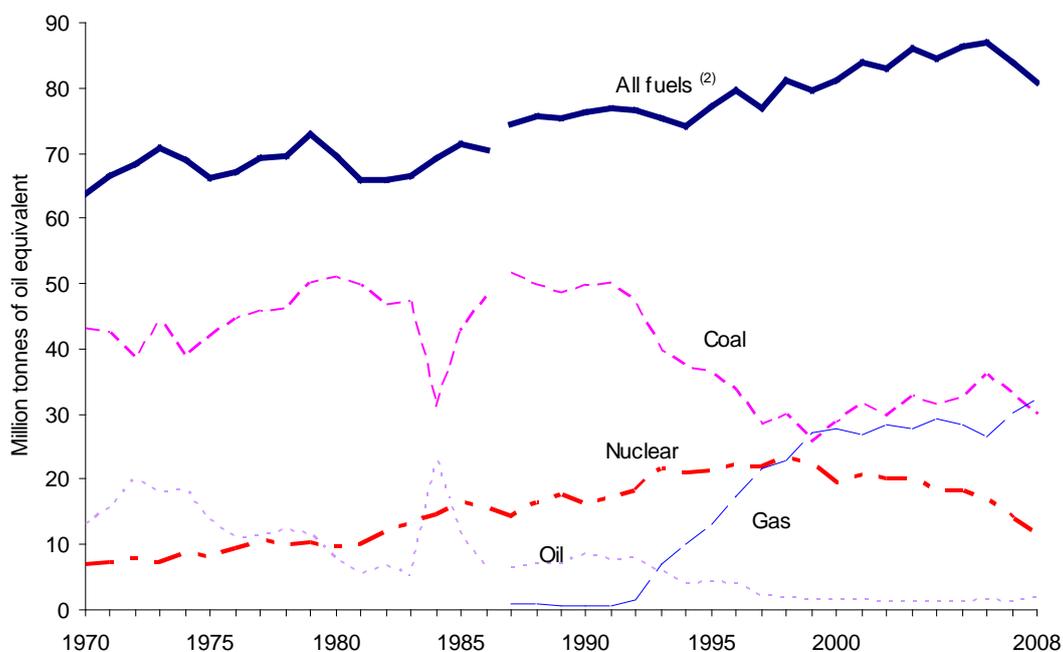
Fuel input for electricity generation (Table 5.1.1)

5.1.1 This table extends the series shown in Table 5.4 of Chapter 5 of the main Digest back to 1970. For the period up to 1987, only fuel inputs for electricity generation at stations owned by the major power producers, transport undertakings, and industrial hydro-electric and nuclear power stations are given; data for conventional thermal electricity generated by industrial producers are not available for this period. From 1987 onwards the table covers **all** generating companies.

5.1.2 The unit of measurement used in this table is the tonne of oil equivalent. An outline of the method used for converting both fossil and non-fossil fuel energy sources to this unit is given in paragraph 5.27 of Chapter 5 of the main Digest.

5.1.3 Trends in fuel input for electricity generation are shown in Chart 5.1.1 and trends in percentage shares in Chart 5.1.2.

Chart 5.1.1: Fuel input for electricity generation⁽¹⁾, 1970 to 2008



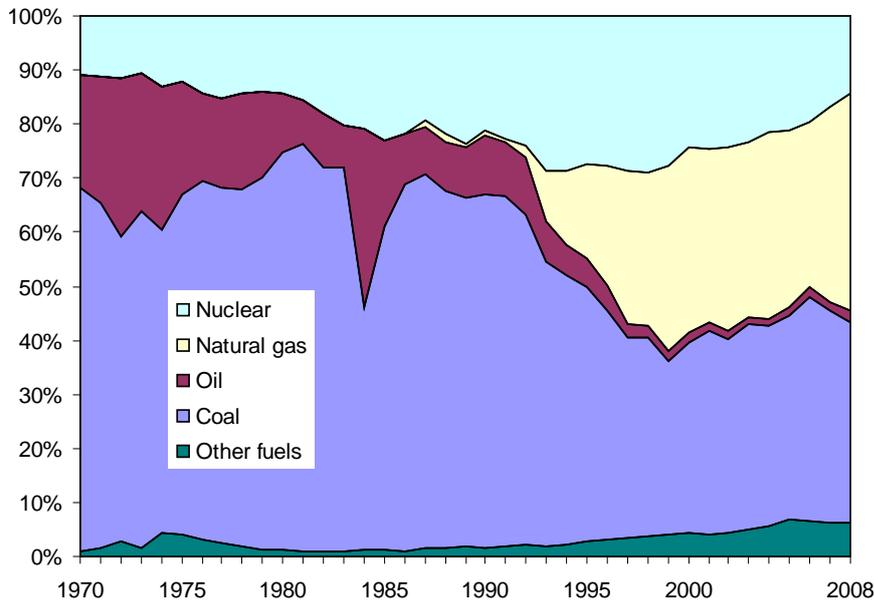
(1) Prior to 1987 major power producers, transport undertakings and industrial hydro and nuclear stations only. From 1987 all generators are covered, hence there is a break in the series for all fuels other than nuclear.

(2) Including hydro, other renewables, coke and other fuels, but excluding electricity imports.

5.1.4 In 1970, coal provided over two thirds of the fuel input for electricity generation, with oil making up two thirds of the rest. Oil use reached a peak in 1972 when it accounted for 29 per cent of fuel input, but after the oil supply crisis in the following year, its use declined, apart from a temporary increase during the 1984/85 miners' dispute. After 1998, the use of oil for electricity generation fell below 2 per cent. Nuclear generation has grown steadily from 11 per cent in 1970 until in 1998 it reached a peak when its oil equivalent input amounted to 29 per cent of total fuel input. In subsequent years, higher levels of outages for maintenance, repair and safety case work reduced this proportion, as did the closure of some older stations. After stabilizing at around 24 per cent in 2000 to 2003, nuclear has since declined, to 14 per cent in 2008, with maintenance outages again impacting significantly. Between 1975 and 1990, a European Community directive limited the use of natural gas in public supply power stations. After 1991 the role of gas in electricity generation grew rapidly, its

share rising from 2 per cent in 1992 to 17 per cent in 1995, and 28 per cent in 1998, before exceeding coal and nuclear in 1999, at 34 per cent.

Chart 5.1.2 Percentage shares of fuel input for electricity generation, 1970 to 2008



Between 2000 and 2005, gas's share remained between 32 and 35 per cent, but in 2006 high gas prices paid by generators reduced the share to the lowest level since 1998, only for gas to re-bounce to a record 36 per cent share in 2007, and further still to 40 per cent in 2008. Throughout the 1970s, 1980s and early 1990s, coal provided the largest input to generation, but by 1999 its share had fallen to 32 per cent, having been 50 per cent as recently as 5 years earlier, and 65 per cent 10 years earlier. Since 2000, coal has been called upon to make up for unavailable nuclear and gas fired stations and then as a substitute for high priced gas, so its share recovered to 38 per cent of fuel input in 2001, remaining at between 36 and 38 per cent for the next four years. Coal's share rose further in 2006 to 41 per cent as gas prices rose significantly higher, falling back to 39 per cent in 2007, and 37 per cent in 2008.

Electricity supply, availability and consumption (Table 5.1.2)

5.1.5 Figures for the supply, availability and consumption of electricity are given in Table 5.1.2. This table retains the nomenclature of electricity chapters in the 1999 and earlier Digests, whereas the balance methodology has introduced a new nomenclature (see Chapter 5 of the main Digest, paragraph 5.30 and Table 5.5). The series in Table 5.1.2 are extended back to 1970.

5.1.6 For the period up to 1986, the data for electricity supplied covered major power producers, transport undertakings and industrial hydro and nuclear stations only. Purchases from other electricity producers are also included, along with net imports, to give electricity available. Losses are deducted from electricity available to give consumption, which is shown by type of consumer. Availability and consumption before 1986 exclude electricity consumed or sold by other generators without passing through the public distribution system.

5.1.7 The table shows that virtually all electricity available came from home supply until 1986 when the interconnector between France and England commenced operations. At their peak in 1994, net imports from France contributed over 5 per cent of total electricity available in the UK. Net imports remained at this high level (supplemented with net imports into Northern Ireland from the Irish Republic over the interconnector re-instated in 1996) until 1997 but then declined. By 2002 the proportion of electricity available had fallen to 2 per cent mainly because, under NETA, electricity prices fell, removing the cost advantages previously enjoyed by French electricity. In 2003, exports of electricity to continental Europe, fostered by higher electricity prices there, became a more prominent

feature, reducing net imports to only 0.6 per cent of electricity available. Between 2004 and 2006, the share of net imports returned to 2 per cent, but in 2007 fell back to 1.4 per cent with higher exports to continental Europe. In 2008, however, net imports doubled, to 2.9 per cent, as imports from the continent increased greatly and exports fell.

5.1.8 Consumption of electricity by industry accounted for around a third of total consumption in 1975 and that proportion is still around a third, despite increased mechanisation. There was a 60 per cent increase in electricity consumption by industry in the 30 years to 2005. In 2006, industrial electricity consumption fell for the first time in 5 years by almost 2 per cent compared to 2005, and has continued to fall since then, with consumption in 2008 5.8 per cent below 2005's record high level.

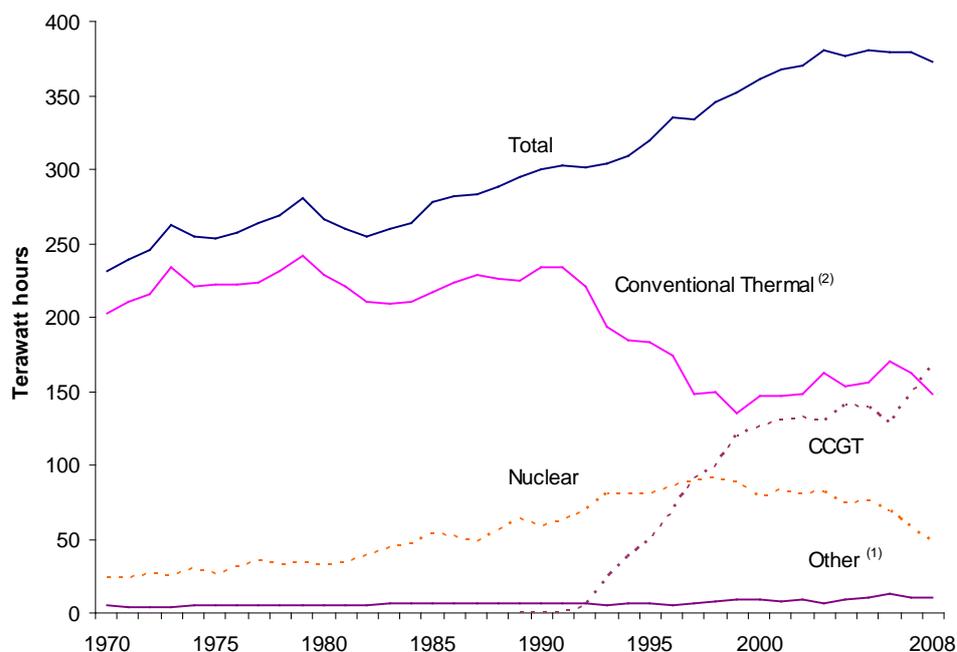
5.1.9 The domestic sector's share of total consumption has fallen from 38 per cent in 1977 to 34 per cent in 2008, despite a 37 per cent increase in electricity consumed by households over the last 30 years. The biggest growth in consumption has been in the services sector which, in 2008, was over twice the level in 1977. Services' share of consumption has risen from 21 per cent in 1970 and 23 per cent in 1977 to 31 per cent in 2008.

Electricity generated and supplied (Table 5.1.3)

5.1.10 Figures for the generation and supply of electricity are given in Table 5.1.3. This table retains the nomenclature of electricity chapters in the 1999 Digest and earlier, whereas the balance methodology has introduced a new nomenclature (see Chapter 5 of the main Digest, paragraph 5.29 and Table 5.5). Data are given for major power producers, for other generators and for all generators in total, with separate series for the different types of power station.

5.1.11 Over the whole period 1970 to 2008, total gross electricity supplied by all generating companies has increased at an average annual rate of 1½ per cent. However, within these thirty seven years there was growth at over 2½ per cent a year in the early 1970s, 2 per cent a year in the late 1970s, a decline of 1 per cent a year on average during the early 1980s, 2 per cent growth again in the late 1980s, and 1½ per cent growth in the 1990s. Between 2000 and 2005, growth slowed to 1 per cent a year, before falling by 1 per cent in 2006, then by 1½ per cent in 2008.

Chart 5.1.3: Gross electricity supplied by all generating companies by type of plant, 1970 to 2008



(1) Other is hydro, wind and other non-thermal renewable sources

(2) Includes electricity supplied by gas turbines, oil engines and thermal renewable sources.

5.1.12 In the period between 1970 and 1994 electricity output by generators other than the major producers fluctuated between 11,000 and 18,000 GWh, but moved up to over 20,000 GWh in 1995. Subsequently, it increased every year to reach almost 34,000 GWh in 2000, mainly as a result of the greater capacity of combined heat and power schemes now in use (see main Digest, Chapter 6). However, in 2001 electricity supplied by other generators fell back to 30,400 GWh, mainly because high gas prices discouraged generation, but has since then it has increased most years to 34,600 GWh in 2006, aided by growth in generation from renewables. The contribution of other generators to total supply was under 7 per cent in 1970 and fell to under 5½ per cent in 1990, but then increased again to reach 9½ per cent in 2000. In 2001 and 2002 it fell back to 8½ per cent before increasing again and reaching just over 9 per cent in 2006. From 2007, major wind farm companies are included under Major Power Producers, so these are no longer included under 'other generators' (see paragraph 5.3 in the main Digest). Despite this, other generators' share has remained at around the 9 per cent mark. Trends in electricity supplied by all generators by type of plant are illustrated in Chart 5.1.3.

5.1.13 In 1970, conventional thermal power stations produced 88 per cent of the gross electricity supplied. Output from these stations reached a peak in 1990 before falling back because of the development of new generating technologies. Firstly there was the development of nuclear generation, which supplied only 10 per cent of total gross electricity supplied by United Kingdom generators in 1970 but by 1997 accounted for 27 per cent. Subsequently, nuclear's share has been on a downward trend and its 13 per cent share in 2008 was the lowest since 1981. Secondly there was the growth of combined cycle gas turbine stations (CCGTs), which overtook nuclear in 1997 and in 2002, supplied 36 per cent, falling back in 2003 and 2006 because of high gas prices, but climbing to a record 39 per cent share in 2007, and then to 45 per cent in 2008.

5.1.14 A more detailed examination of historical electricity statistics was published in the September 2002 issue of Energy Trends. This looked at trends in the generation, supply and consumption of electricity over the last 80 years. The updated data set on which the article is based includes data for 2008 and is available on the Internet at:

www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx

The original article is to be found at: www.berr.gov.uk/files/file11864.pdf (page 20).

5.1.1 Fuel input for electricity generation⁽¹⁾ 1970 to 2008

	Million tonnes of oil equivalent								
	Total all fuels	Coal	Oil (2)	Natural gas (3)	Electricity			Coke and breeze	Other fuels (4)
					Nuclear	Natural flow hydro	Wind		
1970	63.84	43.07	13.27	0.11	7.00	0.39	-	-	-
1971	66.46	42.42	15.63	0.64	7.37	0.29	-	0.11	-
1972	68.37	38.47	20.13	1.61	7.87	0.29	-	-	-
1973	70.93	44.30	18.09	0.64	7.46	0.33	-	0.11	-
1974	69.01	38.71	18.41	2.46	8.97	0.35	-	0.11	-
1975	66.25	41.85	13.70	2.14	8.12	0.33	-	0.11	-
1976	66.97	44.49	10.92	1.61	9.56	0.39	-	-	-
1977	69.32	45.71	11.35	1.28	10.64	0.34	-	-	-
1978	69.64	46.05	12.31	0.86	9.96	0.35	-	0.11	-
1979	72.80	50.10	11.45	0.54	10.23	0.37	-	0.11	-
1980	69.46	51.01	7.67	0.42	9.91	0.34	-	0.11	-
1981	65.98	49.64	5.46	0.21	10.18	0.38	-	0.11	-
1982	65.98	46.75	6.64	0.21	11.88	0.39	-	0.11	-
1983	66.37	47.16	5.14	0.21	13.47	0.39	-	-	-
1984	69.18	31.07	22.80	0.42	14.50	0.39	-	-	-
1985	71.54	42.81	11.35	0.54	16.50	0.34	-	-	-
1986	70.46	47.91	6.51	0.18	15.44	0.41	-	-	-
1987 (5)	70.50	50.37	5.14	0.19	14.44	0.36	-	-	-
1987 (5)	74.31	51.58	6.30	0.91	14.44	0.36	-	-	0.72
1988	75.57	49.83	7.01	0.97	16.57	0.42	-	-	0.77
1989	75.27	48.59	7.11	0.54	17.74	0.41	-	-	0.88
1990	76.34	49.84	8.40	0.56	16.26	0.44	-	-	0.84
1991	76.87	49.98	7.56	0.57	17.43	0.39	-	-	0.94
1992	76.57	46.94	8.07	1.54	18.45	0.46	-	-	1.09
1993	75.40	39.61	5.78	7.04	21.58	0.37	-	-	1.02
1994	74.01	37.10	4.11	10.10	21.20	0.44	-	-	1.06
1995	77.15	36.29	4.15	13.27	21.25	0.40	-	-	1.79
1996	79.56	33.67	3.87	17.37	22.18	0.29	0.04	-	2.14
1997	76.76	28.30	2.01	21.74	21.98	0.38	0.06	-	2.29
1998	81.14	29.94	1.69	23.02	23.44	0.44	0.08	-	2.52
1999	79.72	25.51	1.54	27.13	22.22	0.46	0.07	-	2.79
2000	81.21	28.67	1.55	27.91	19.64	0.44	0.08	-	2.93
2001	84.01r	31.61	1.42	26.87r	20.77	0.35	0.08	-	2.91
2002	83.00r	29.63	1.29	28.33r	20.10	0.41	0.11	-	3.13
2003	85.95r	32.54	1.19	27.85r	20.04	0.28	0.11	-	3.93
2004	84.57	31.31	1.10	29.25	18.16	0.42	0.17	-	4.16
2005	86.39	32.58	1.35	28.24	18.37	0.42	0.25	-	5.19
2006	86.84r	35.94r	1.54r	26.51r	17.13	0.39	0.36	-	4.97r
2007	84.08r	32.86r	1.26r	30.33r	14.04	0.44	0.45r	-	4.70r
2008	81.57	29.89	1.77	32.43	11.91	0.45	0.61	-	4.51

(1) Fuel inputs have been calculated on an energy supplied basis - see explanatory notes at Chapter 5, paragraph 5.30.

(2) Includes oil used in gas turbine and diesel plant or for lighting up coal fired boilers, Orimulsion (until 1997), and refinery gas (from 1987).

(3) Includes colliery methane from 1987 onwards.

(4) Main fuels included are coke oven gas, blast furnace gas, waste products from chemical processes, refuse derived fuels and other renewable sources.

(5) Data for all generating companies are only available from 1987 onwards, and the figures for 1987 to 1989 include a high degree of estimation. Before 1987 the data are for major power producers, transport undertakings and industrial hydro and nuclear stations only.

5.1.2 Electricity supply, availability and consumption 1970 to 2008

TWh

	Electricity supplied (net)	Purchases from other producers	Net imports (1)	Electricity available	Losses in transmission etc (2)	Electricity consumption					
						Total	Fuel industries	Final users			Total
								Industrial	Domestic	Other (3)	
1970	215.76	0.19	0.55	216.50	17.50	199.00	6.59	72.99	77.04	42.38	192.41
1971	222.92	0.53	0.12	223.57	19.01	204.56	6.60	73.43	80.67	43.86	197.96
1972	229.45	0.53	0.48	230.46	18.91	211.55	6.37	73.16	86.89	45.13	205.18
1973	245.42	0.59	0.06	246.07	19.59	226.48	6.67	80.07	91.30	48.44	219.81
1974	237.21	0.60	0.05	237.86	18.22	219.64	6.12	75.81	92.63	45.08	213.52
1975	237.76	0.70	0.08	238.54	19.47	219.07	6.29	75.36	89.21	48.21	212.78
1976	240.22	0.61	-0.10	240.73	18.73	222.00	6.39	80.84	85.12	49.65	215.61
1977	246.82	0.74	-	247.56	20.76	226.80	6.41	82.06	85.90	52.43	220.39
1978	252.65	0.66	-0.08	253.23	21.81	231.42	6.52	84.00	85.80	55.10	224.90
1979	264.34	0.63	-	264.97	22.97	242.00	6.78	87.55	89.67	58.00	235.22
1980	252.02	0.61	-	252.63	21.53	231.11	6.86	79.73	86.11	58.41	224.25
1981	246.60	0.74	-	247.34	20.13	227.21	6.86	77.03	84.44	58.88	220.35
1982	242.48	0.82	-	243.30	20.48	222.82	6.81	73.91	82.79	59.31	216.01
1983	246.15	1.15	-	247.30	21.21	226.09	6.69	74.17	82.95	62.28	219.40
1984	251.47	0.55	-	252.02	21.06	230.96	6.64	78.64	83.90	61.78	224.32
1985	263.56	0.92	-	264.48	22.63	241.85	7.76	79.53	88.23	66.33	234.09
1986(4)	266.81	1.10	4.26	272.17	22.83	249.34	7.68	80.15	91.83	69.68	241.66
1986(4)	278.48	-	4.26	282.73	22.91	259.82	9.51	88.80	91.83	69.68	250.31
1987	279.71	-	11.64	291.34	22.96	268.38	9.49	93.14	93.25	72.50	258.89
1988	285.71	-	12.14	297.85	23.35	274.50	9.16	97.14	92.36	75.84	265.34
1989	291.75	-	12.63	304.38	24.98	279.40	9.00	99.42	92.27	78.71	270.40
1990	297.50	-	11.91	309.41	24.99	284.42	9.99	100.64	93.79	80.00	274.43
1991	300.65	-	16.41	317.06	26.22	290.84	9.79	99.57	98.10	83.38	281.05
1992	298.55	-	16.69	315.24	23.79	291.45	9.98	95.28	99.48	86.71	281.47
1993	301.87	-	16.72	318.59	22.84	295.75	9.62	96.84	100.46	88.83	286.13
1994	306.94	-	16.89	323.83	31.00	292.83	7.52	96.12	101.41	87.78	285.31
1995	317.63	-	16.61	334.24	30.32	303.92	8.07	101.78	102.21	91.86	295.85
1996	332.36	-	16.76	349.11	29.34	319.78	9.21	107.63	107.51	95.42	310.57
1997	331.63	-	16.57	348.20	27.14	321.07	8.62	108.10	104.46	99.88	312.44
1998	342.70	-	12.47	355.17	29.82	325.35	8.41	108.44	109.41	99.09	316.94
1999	347.67	-	14.24	361.92	29.86	332.05	8.04	112.25	110.31	101.46	324.02
2000	357.27	-	14.17	371.44	31.14	340.30	9.70	115.29	111.84	103.47	330.59
2001	364.17r	-	10.40	374.57r	32.07r	342.50	8.63	112.50	115.34	106.05	333.88
2002	366.66	-	8.41	375.07	30.96	344.11	10.06	113.30	114.53	106.22	334.05
2003	376.53	-	2.16	378.69	32.07	346.62	9.75	114.01	115.76	107.10	336.87
2004	373.40r	-	7.49	380.89	33.18r	347.71r	8.14	116.47	115.53	107.58	339.57
2005	376.78r	-	8.32	385.10r	30.10r	355.00	7.85	121.20	116.81	109.14	347.15
2006	373.87r	-	7.52	381.39r	28.46r	352.93r	8.00r	118.55r	116.45	109.93r	344.93r
2007	374.27r	-	5.22	379.49r	27.45r	352.04r	10.06r	117.61r	115.05	109.31r	341.97r
2008	367.96	-	11.02	378.98	28.48	350.51	8.38	114.12	117.84	110.16	342.13

(1) Net transfers between the Irish Republic and Northern Ireland (ceased in 1981 and recommenced in 1996) and between France and England (from 1986).

(2) Losses on the public distribution system (grid system and local networks) and other differences between data collected on sales and data collected on availability.

(3) Public administration, transport, agricultural and commercial sectors.

(4) Data for all generating companies are only available from 1986 onwards. Before 1986 the data are for major power producers, transport undertakings and industrial hydro and nuclear stations only.

5.1.3 Electricity generated and supplied 1970 to 2008

										GWh
Major power producers (1)										
Electricity generated	Electricity used on works	Electricity supplied (gross) (2)							Electricity used in pumping at pumped storage stations	Electricity Supplied (net) (4)
		Total	Conventional thermal and other (3)	CCGT	Nuclear	Hydro				
						Natural flow	Pumped storage			
1970	232,378	16,429	215,949	188,175	-	22,805	3,846	1,123	1,487	214,462
1971	240,080	17,143	222,937	195,181	-	24,013	2,835	908	1,209	221,728
1972	246,843	17,439	229,404	200,048	-	25,639	2,847	870	1,184	228,220
1973	263,140	18,157	244,983	216,796	-	24,310	3,214	663	882	244,101
1974	254,688	17,763	236,925	203,478	-	29,232	3,520	695	896	236,029
1975	255,084	17,136	237,948	207,159	-	26,463	3,186	1,140	1,430	236,518
1976	258,656	17,962	240,694	205,048	-	31,153	3,128	1,365	1,729	238,965
1977	265,649	18,468	247,181	207,904	-	34,660	3,320	1,297	1,608	245,573
1978	270,677	17,907	252,770	215,761	-	32,462	3,378	1,169	1,429	251,341
1979	283,186	18,744	264,442	226,329	-	33,335	3,617	1,161	1,424	263,018
1980	269,945	17,765	252,180	215,418	-	32,291	3,298	1,173	1,453	250,727
1981	263,658	16,983	246,675	208,589	-	33,191	3,906	989	1,196	245,479
1982	259,410	16,940	242,470	198,822	-	38,721	3,873	1,054	1,272	241,198
1983	264,589	17,380	247,209	197,600	-	43,911	3,882	1,816	2,337	244,872
1984	270,471	17,643	252,828	200,240	-	47,256	3,358	1,974	2,613	250,215
1985	284,712	18,903	265,809	205,906	-	53,767	3,435	2,701	3,494	262,315
1986	287,330	18,819	268,511	210,452	-	51,843	4,087	2,129	2,993	265,518
1987	287,701	18,740	268,961	215,290	-	48,205	3,460	2,006	2,804	266,157
1988	293,100	19,341	273,759	211,932	-	55,642	4,160	2,025	2,888	270,871
1989	297,890	19,315	278,575	209,169	-	63,602	3,992	1,812	2,572	276,003
1990	302,936	18,632	284,304	219,364	-	58,664	4,384	1,892	2,626	281,678
1991	305,704	19,142	286,562	218,260	309	62,761	3,767	1,465	2,109	284,453
1992	303,715	19,157	284,558	206,245	2,964	69,135	4,579	1,635	2,257	282,301
1993	305,433	18,170	287,264	178,773	22,611	80,979	3,513	1,388	1,948	285,316
1994	307,476	16,696	290,780	168,321	36,815	79,962	4,265	1,417	2,051	288,729
1995	315,510	16,510	299,000	164,324	48,525	80,598	4,051	1,502	2,282	296,718
1996	326,235	14,967	311,268	155,574	65,604	85,820	2,763	1,507	2,430	308,838
1997	324,133	15,411	308,722	127,961	86,682	89,341	3,299	1,439	2,477	306,245
1998	333,764	16,140	317,624	128,235	93,005	90,590	4,225	1,569	2,594	315,030
1999	336,608	15,461	321,147	113,493	112,768	87,672	4,409	2,804	3,774	317,373
2000	341,783	14,952	326,831	125,468	116,110	78,334	4,316	2,603	3,499	323,332
2001	353,057r	16,066	336,991r	127,119r	121,344	82,985	3,203	2,340	3,210	333,781r
2002	353,994	15,746	338,248	128,795	121,886	81,090	3,914	2,562	3,463	334,785
2003	362,600	16,747	345,853r	140,196	118,546	81,911	2,559	2,641	3,546	342,308
2004	358,313	15,582	342,732r	133,607	128,983	73,682	3,901	2,559	3,497	339,235r
2005	362,156r	16,209r	345,947	135,999	128,179	75,173	3,821	2,776	3,707	342,240
2006	361,232r	17,031r	344,201r	151,163r	116,398	69,237	3,680	3,722	4,918	339,283r
2007	361,410r	16,099r	345,311r	142,542r	137,561	57,249	4,114	3,846	5,071	340,240r
2008	355,284	14,671	340,613	128,432	156,225	47,673	4,209	4,075	5,371	335,242

(1) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.3 in the main Digest

(2) Electricity generated less electricity used on works.

(3) Includes electricity supplied by gas turbines and oil engines. From 1988 also includes electricity produced by plants using

5.1.3 Electricity generated and supplied 1970 to 2008 (continued)

										GWh
Other generators (1)				All generating companies						
Electricity supplied (gross) (2)				Electricity supplied (gross)						
Total	Conventional thermal and other (3)	CCGT	Non- thermal renewables (5)	Total	Conventional thermal and other (3)	CCGT	Nuclear	Non- thermal renewables (5) and pumped storage	Electricity supplied (net) (4)	
15,674	14,996	-	678	231,623	203,171	-	22,805	5,647	230,136	1970
15,388	14,837	-	551	238,325	210,018	-	24,013	4,294	237,116	1971
15,746	15,175	-	571	245,150	215,223	-	25,639	4,288	243,966	1972
17,655	17,008	-	647	262,638	233,804	-	24,310	4,524	261,756	1973
17,222	16,660	-	562	254,147	220,138	-	29,232	4,777	253,251	1974
15,766	15,175	-	591	253,714	222,334	-	26,463	4,917	252,284	1975
17,013	16,414	-	599	257,707	221,462	-	31,153	5,092	255,978	1976
16,434	15,848	-	586	263,615	223,752	-	34,660	5,203	262,007	1977
16,034	15,387	-	647	268,804	231,148	-	32,462	5,194	267,375	1978
15,720	15,062	-	658	280,162	241,391	-	33,335	5,436	278,738	1979
14,132	13,509	-	623	266,312	228,927	-	32,291	5,094	264,859	1980
13,264	12,801	-	463	259,939	221,390	-	33,191	5,358	258,743	1981
12,613	11,943	-	670	255,083	210,765	-	38,721	5,597	253,811	1982
12,152	11,486	-	666	259,361	209,086	-	43,911	6,364	257,024	1983
11,319	10,685	-	634	264,148	210,925	-	47,256	5,966	261,535	1984
12,112	11,467	-	645	277,922	217,373	-	53,767	6,781	274,427	1985
12,957	12,278	-	679	281,469	222,730	-	51,843	6,895	278,476	1986
13,551	12,831	-	720	282,512	228,121	-	48,205	6,186	279,708	1987
14,840	14,085	-	755	288,599	226,018	-	55,642	6,939	285,711	1988
15,747	15,007	-	740	294,322	224,176	-	63,602	6,544	291,751	1989
15,824	14,738	280	806	300,128	234,101	280	58,664	7,082	297,502	1990
16,202	15,065	298	839	302,764	233,325	607	62,761	6,071	300,654	1991
16,246	15,020	394	832	300,804	221,265	3,358	69,135	7,046	298,547	1992
16,552	15,196	584	772	303,816	193,969	23,195	80,979	5,673	301,868	1993
18,207	16,700	738	769	308,987	185,021	37,553	79,962	6,451	306,936	1994
20,909	19,243	933	733	319,909	183,567	49,458	80,598	6,286	317,627	1995
23,519	19,091	3,358	1,070	334,787	174,665	68,962	85,820	5,340	332,357	1996
25,384	19,703	4,192	1,489	334,106	147,664	90,874	89,341	6,227	331,629	1997
27,669	20,766	5,157	1,746	345,293	149,001	98,162	90,590	7,540	342,699	1998
30,298	21,769	6,785	1,745	351,445	135,262	119,553	87,672	8,958	347,671	1999
33,934r	21,926	10,318	1,690	360,765r	147,394	126,428	78,334	8,609	357,266	2000
30,391r	20,066	8,531	1,794r	367,382r	147,185r	129,875	82,985	7,337r	364,173r	2001
31,873	19,716	10,049	2,108	370,120	148,511	131,935	81,090	8,584	366,657	2002
34,220	21,942	10,336	1,941	380,073r	162,138r	128,882	81,911	7,142r	376,528	2003
34,165r	20,046r	11,260	2,859	376,896r	153,653r	140,243	73,682	9,319r	373,399r	2004
34,539r	19,494r	11,204	3,842	380,486r	155,492r	139,383	75,173	10,438	376,780r	2005
34,588r	18,483r	10,984	5,121	378,789r	169,646r	127,382	69,237	12,524r	373,871r	2006
34,034r	20,445r	10,941	2,649r	379,346r	162,987r	148,502	57,249	10,608r	374,274r	2007
32,719	19,575	10,460	2,684	373,332	148,006	166,685	47,673	10,968	367,961	2008

(4) Electricity supplied (gross) less electricity used in pumping at pumped storage station.

(5) Natural flow hydro, wind, wave and solar photovoltaics.

Chapter 6: Long term trends

Combined Heat and Power

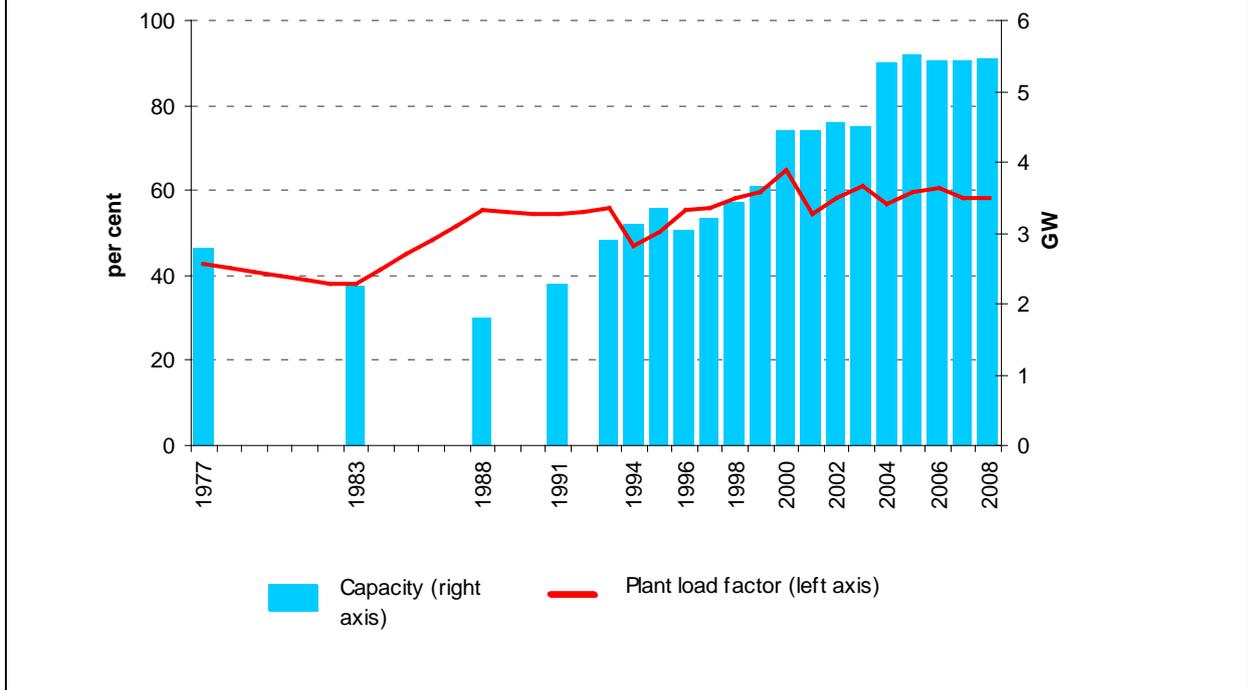
Combined Heat and Power: capacity, generation and fuel use (Table 6.1.1)

6.1.1 This table extends the summary series shown in Table 6A of Chapter 6 of the main Digest back to 1977, the earliest year for which data on Combined Heat and Power (CHP) are available. CHP data have been collected on an annual basis since 1993, but before that the data were collected on an occasional basis.

6.1.2 As Chart 6.1.1 shows, between 1993 and 2005 the electricity generating capacity of CHP increased by over 90 per cent, at an average rate of over 5 per cent a year. However, since 2005 capacity has levelled off. The Government has a target for at least 10,000 MWe of good quality CHP by 2010 as part of the UK's Climate Change programme.

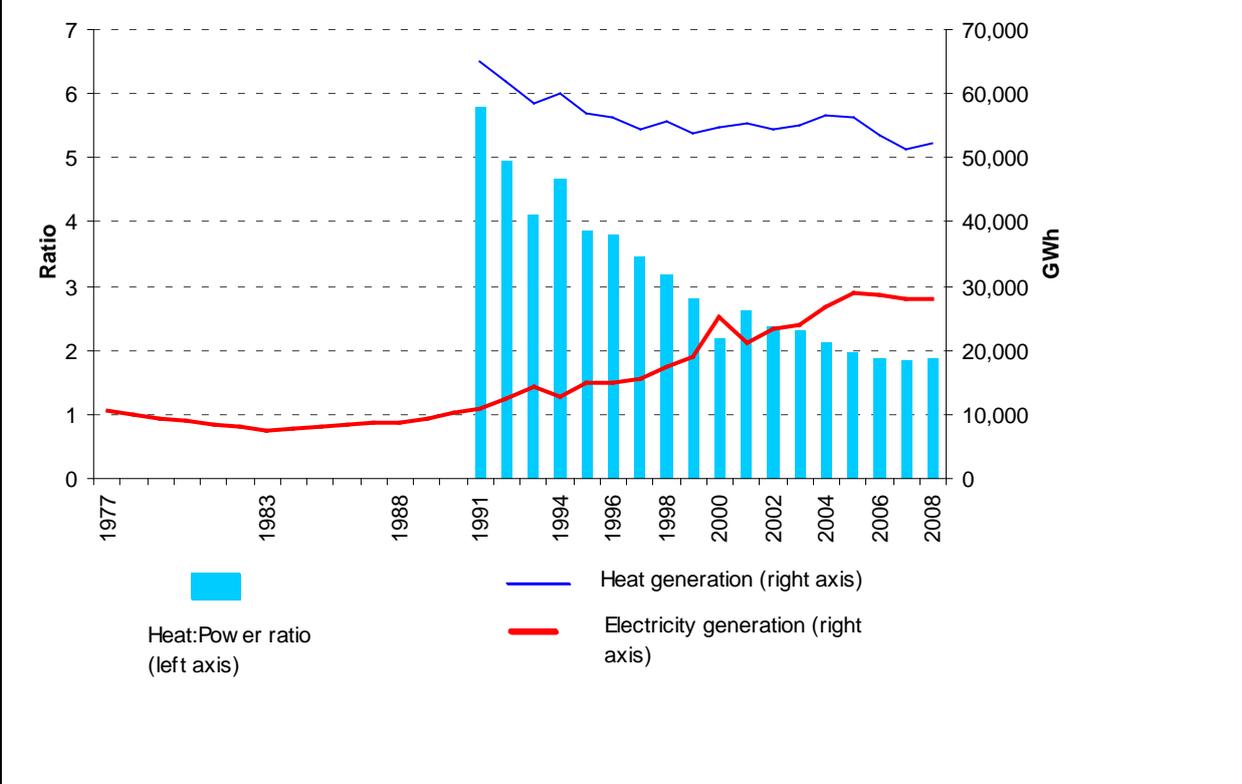
6.1.3 The plant load factor measures how intensively the CHP plants are used. The average load factor peaked in 2000 at around 65 per cent but fell sharply in 2001 to around 54 per cent following a fall in the electricity price. The load factor has since grown again and is now just over 58 per cent.

Chart 6.1.1: CHP electricity generation capacity and average load factor 1977 to 2008



6.1.4 Between 1995 and 2005 heat generation at CHP plants showed a fairly stable pattern remaining within the 53,500 to 57,000 GWh band, but it dipped out of this band in 2006 and fell further to just over 52,000 GWh in 2008. However, over the same 11 year period (1995-2005) electricity generation from CHP has almost doubled, equivalent to a growth rate of 5½ per cent a year, although since 2005 there has been little growth. The rise in generation up to 2000 reflected the liberalisation of the electricity markets which gave a strong incentive to design schemes to maximise the electricity generation for a given heat load since the electricity could be sold on to suppliers. Newer CHP schemes thus tended to have lower heat to power ratios as Chart 6.1.2 shows. One of the effects of the introduction of the New Electricity Trading Arrangements (NETA) in March 2001 was a fall in the price of electricity, including the price of electricity exported from CHP plants. This led to a decline in investment in new plants and also a decline in the electrical output of existing CHP plants between 2000 and 2001. Following the sharp decline in 2001 electricity generation at CHP plants rose again to its peak in 2005, exceeded the 2000 level by 14 per cent, following which growth has now levelled off.

Chart 6.1.2: CHP electricity and heat generation and heat:power ratio 1977 to 2008



Heat to power ratios and heat generation data are not available before 1991

6.1.1 Combined Heat and Power: capacity, generation and fuel use ⁽¹⁾

	Number of schemes	Electricity capacity (2)	Heat capacity MWth	Heat to power ratio (3)	Fuel input GWh	Electricity generation (4)	Heat generation (5)	Overall efficiency (4)	Load factor (6)
		MWe				GWh	GWh	Per cent	Per cent
1977	..	2,793	..	..	..	10,450	..	..	43
1983	..	2,254	..	..	..	7,500	..	..	38
1988	..	1,793	..	..	..	8,700	..	..	55
1991	266	2,293	13,361	5.80	113,537	10,917	65,174	67	54
1993	996	2,893	14,442	4.12	101,650	14,171	58,418	71.4	55.9
1994	1,142	3,117	15,704	4.67	97,480	12,853	60,079	74.8	47.1
1995	1,224	3,355	15,698	3.85	106,515	14,778	56,833	67.2	50.3
1996	1,303	3,042	15,383	3.81	98,006	14,785	56,291	72.5	55.5
1997	1,324	3,205	15,027	3.46	97,894	15,702	54,335	71.5	55.9
1998	1,335	3,440	15,112	3.16	100,890	17,573	55,585	72.5	58.3
1999	1,359	3,670	14,645	2.81	100,564	19,108	53,762	72.5	59.4
2000	1,346	4,452	11,608	2.17	106,243	25,250	54,884r	75.4	64.6
2001	1,375	4,454	11,618	2.61	109,362	21,236	55,418	70.1	54.4
2002	1,354	4,566	11,272	2.35	112,682	23,226	54,572	69.0	58.1
2003	1,356	4,495	10,934	2.30	113,100	23,938	54,985	69.8	60.8
2004	1,340r	5,397r	11,773r	2.10	120,188r	26,855r	56,524r	69.4	56.8
2005	1,372r	5,534r	11,500r	1.96	124,616r	28,831r	56,448r	68.4	59.5
2006	1,378r	5,434r	11,211r	1.86r	122,371r	28,738r	53,418r	67.1	60.4r
2007	1,435r	5,450r	11,091r	1.84r	118,664r	27,851r	51,323r	66.7r	58.3r
2008	1,439	5,469	10,924	1.87	119,121	27,911	52,197	67.2	58.3

(1) A large number of values in this table, mainly for the years 2000 to 2006, have been revised this year as part of the continuing exercise to improve the data quality described in paragraph 6.11 of Chapter 6 of the Digest of UK Energy Statistics 2008.

(2) (CHP_{QPO}) basis from 1995 onwards

(3) Heat to power ratios are calculated from the qualifying heat output (QHO) and the qualifying power output (QPO) (and their equivalents in the years before the CHPQA scheme was used for CHP statistics).

(4) These are calculated using gross calorific values; overall net efficiencies are some 5 percentage points higher.

(5) (CHP_{QHO}) basis from 1995 onwards

Chapter 7: Long term trends

Renewables

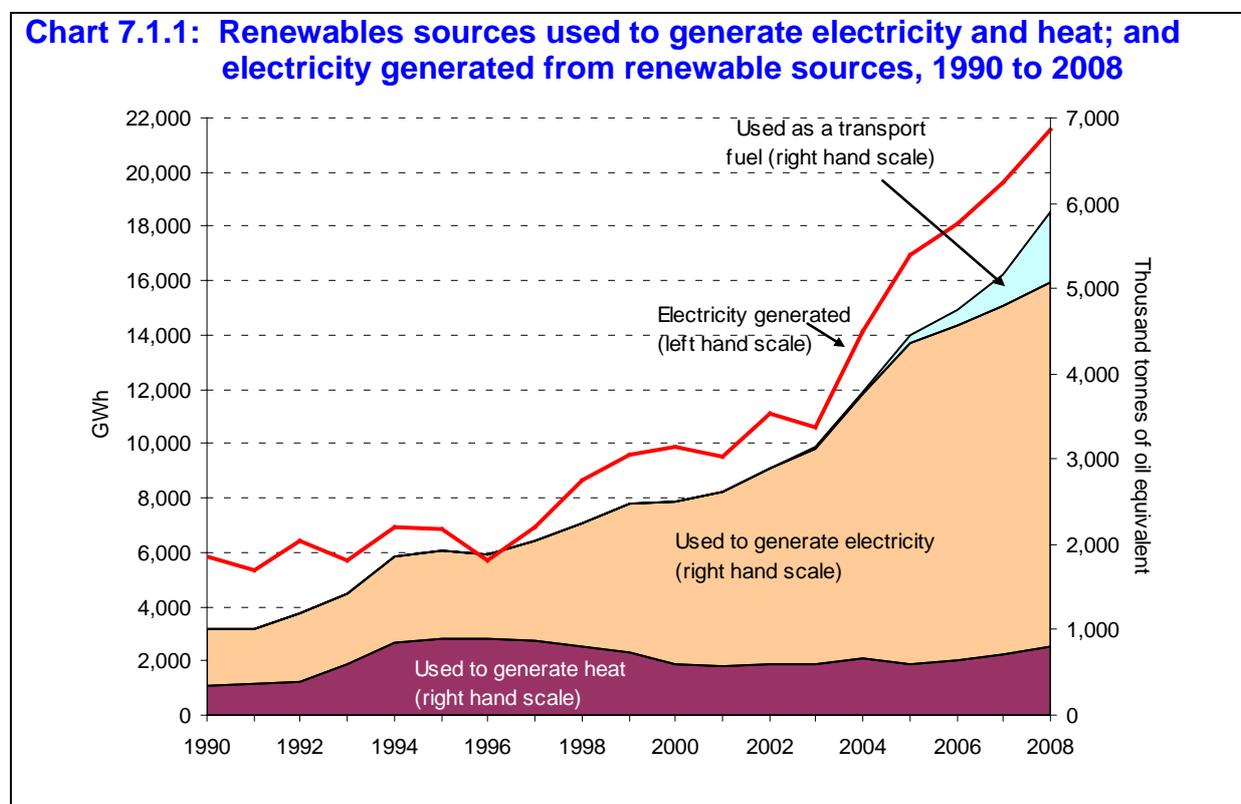
Renewables sources used to generate electricity and heat; and electricity generated from renewable sources (Table 7.1.1)

7.1.1 This table extends the series shown in Table 7.4 and 7.6 of Chapter 7 of the main Digest back to 1990, the earliest year for which comprehensive data on renewables and wastes are available.

7.1.2 Between 1990 and 1996 the volume of renewables used to generate electricity grew at an average rate of 7 per cent a year. After 1996 the rate of increase quickened and over the seven years to 2003 it averaged 14½ per cent a year. Between 2003 and 2005 it quickened again to 22 per cent a year, but slowed to an average of 4 per cent between 2005 and 2008. The rate of increase in the volume of renewables used is influenced by how fuels are used. Use of primary sources (mainly wind and hydro) are assumed to be equal to the electricity produced whereas biomass sources lose energy during their transformation into electricity. As a result in years where biomass was increasing, the volume of fuel used would increase by more than in years when wind increased. Hence the growth in electricity generated from renewables has been more erratic, as Chart 7.1.1 illustrates. Between 2000 and 2007 the rate of growth in renewable sources to generate electricity averaged 11½ per cent a year; the growth rate during 2008 was 5 per cent.

7.1.3 Since 2000, the main contributors to the growth in electricity generated from renewables have been wind (+29 per cent a year on average), small scale hydro schemes (+13 per cent a year), landfill gas (+10 per cent a year), sewage sludge digestion (+6 per cent a year), and municipal solid waste (+5 per cent a year). Co-firing of biomass with fossil fuels was zero until 2002, but more than doubled each year between 2002 and 2005 before levelling off in 2006 and subsequently declined by an average of 20 per cent per year between 2006 and 2008. Between 2000 and 2007 the rate of growth in electricity generated from renewables averaged just over 10 per cent a year; the change in generation during 2008 compared to 2007 also showed a 10 per cent rise.

Chart 7.1.1: Renewables sources used to generate electricity and heat; and electricity generated from renewable sources, 1990 to 2008



7.1.4 The use of renewables to generate heat reached a peak in 1996 having more than doubled over the previous 6 years. Over the next five years the use of renewables for heat generation

declined by a third, mainly because of use of industrial wood declined by over one-half due to the introduction of more stringent emission controls. Industrial wood use has fallen further and is currently only about 20 per cent of its 1996 level. A re-assessment of domestic use of wood in the light of new research has shown growth over the last five years sufficient to put the total use of renewables for heat on a rising trend equivalent to an increase of 3 per cent per year since 2000.

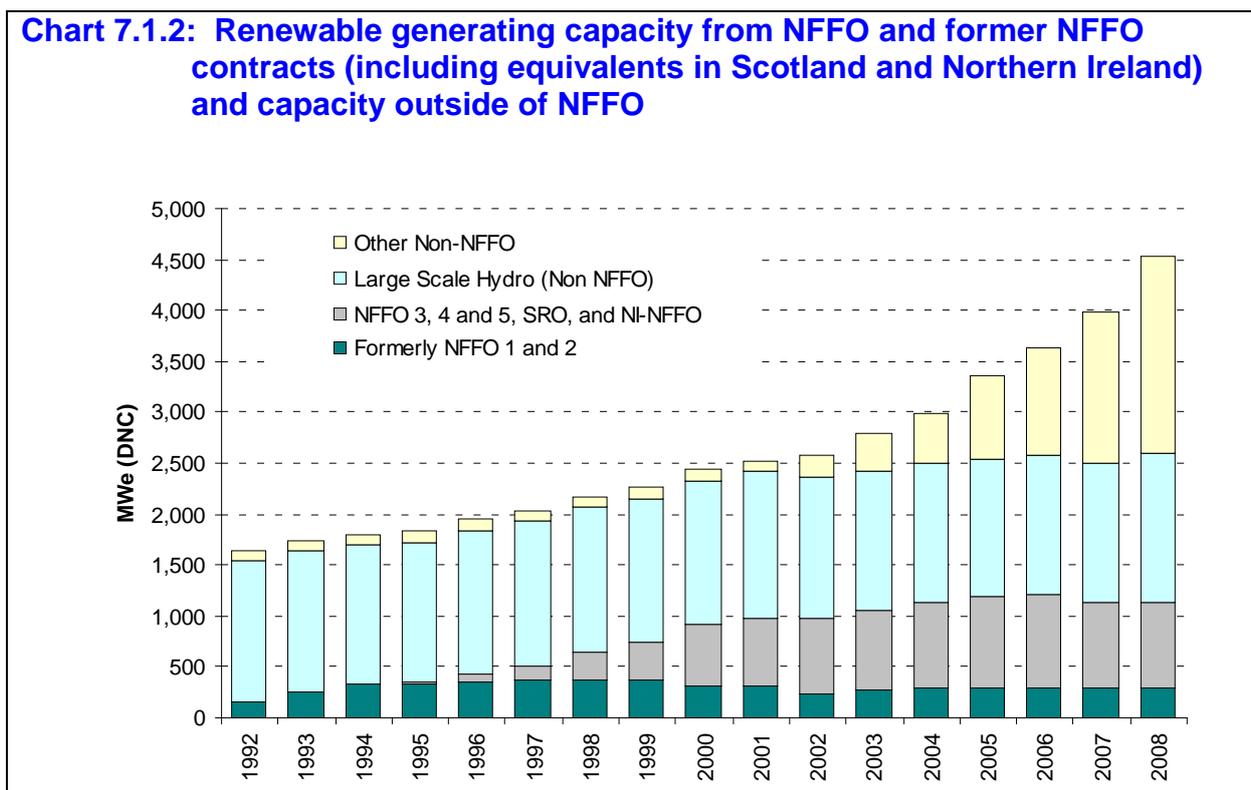
Renewable orders and operational capacity (Table 7.1.2)

7.1.5 Table 7.1.2 brings together the information on contracted and live projects and their capacities contracted within the Non Fossil Fuel Orders in England, Wales and Northern Ireland and under the Scottish Renewables Orders. This information is no longer shown in the printed and bound Digest.

(a) Non Fossil Fuel Obligation (NFFO)

7.1.6 The 1989 Electricity Act empowered the Secretary of State to make orders requiring the Regional Electricity Companies in England and Wales (the RECs) to secure specified amounts of electricity from renewable energy sources.

Chart 7.1.2: Renewable generating capacity from NFFO and former NFFO contracts (including equivalents in Scotland and Northern Ireland) and capacity outside of NFFO



7.1.7 Five NFFO Orders were made, of which the first in 1990 was set for a total of 102 MW Declared Net Capacity (DNC). This first order resulted in contracts for 75 projects for 152 MW DNC and provided a premium price for the electricity produced which was funded from a levy on electricity sales in England and Wales. (The bulk of this levy was used to support electricity from nuclear stations).

7.1.8 The second Order, made in late 1991, was set for 457 MW DNC. This resulted in 122 separate contracts (for a total of 472 MW DNC) between the generators and the Non-Fossil Purchasing Agency (NFPA), which acted on behalf of the RECs. For landfill gas, sewage gas and waste-derived generation contracts were awarded at around 6p/kWh, while for wind-based generation a price of 11p/kWh was established. These prices reflected the limited period for the recovery of capital costs.

7.1.9 The third Order covers the period 1995 to 2014; this was for 627 MW DNC of contracted capacity at an average price of 4.35 p/kWh. The lower bid prices reflect the longer-term contracts, which are now available together with further developments that have led to improvements in the technologies. Taking into account factors such as the failure to gain planning permission it is estimated that about 300-400 MW DNC are likely to go forward for commissioning.

7.1.10 The fourth Order was announced in February 1997. Contracts have been let to 195 projects with a total DNC of 843 MW, at an average price of 3.46 p/kWh. In the fifth and largest Order, which was announced in September 1998, contracts have been let to 261 projects with a total DNC of 1,177.2 MW, at an average price of 2.71 p/kWh.

7.1.11 Since the expiry of the NFFO 1 and 2 contracts on 31 December 1998, these projects are no longer included in the monitoring of NFFO Orders and DECC no longer receives any status/output data on them from the NFPA. For some of these projects operational data have been obtained from other sources, while for the others estimates have been made based on output in 1998. From 2002 another source of information became available in the form of the Renewables Obligation data. This enabled AEA to identify which former NFFO 1 and 2 schemes were applying for ROCs and therefore were still running. Of the 114 NFFO 1 and 2 projects identified in this way as still live, 42 were contracted under the first order and 72 under the second order. It is appreciated that there may be some ex NFFO 1 and 2 schemes that are continuing to operate but whose output is too small to qualify for ROCs or which may need to re-furbish in order to qualify for ROCs. To that extent the estimates of NFFO capacity may be an underestimate.

7.1.12 As at the end of December 2008, 80 projects in the third Order were operational, with total capacities of 304 MW DNC. There were also 86 schemes with a capacity of 242 MW DNC commissioned from the fourth Order projects and 88 schemes totalling 175 MW DNC from the fifth Order. Table 7.1.2 sets out the technologies and capacities of schemes in all five Orders.

(b) Scottish Renewable Order (SRO)

7.1.13 In Scotland, the first Renewables Order was made in 1994 for approximately 76 MW DNC of new capacity and comprising 30 schemes. At the end of December 2008, 18 schemes were commissioned with a capacity of 39 MW DNC.

7.1.14 A second SRO was launched in 1995 and was made in March 1997 for 114 MW DNC of new capacity comprising 26 schemes. Under this Order, at the end of 2008 there were 13 commissioned schemes with a capacity of 50 MW DNC.

7.1.15 A third SRO was laid before Parliament in February 1999 for 145 MW DNC of new capacity comprising 53 schemes. Under this Order, at the end of 2008 there were 15 commissioned schemes with a capacity 26 MW DNC. Table 7.1.2 sets out the technologies and capacities of schemes in all three Scottish Orders.

(c) Northern Ireland Non Fossil Fuel Obligation (NI NFFO)

7.1.16 In Northern Ireland, a first Order was made in March 1994 for approximately 16 MW DNC comprising 20 schemes. The contracted schemes were spread throughout Northern Ireland and were divided into three technology bands. At the end of 2008, 15 schemes were commissioned with a capacity of 15 MW DNC.

7.1.17 A second NI Order was made in 1996 for 10 schemes, totalling 16 MW DNC. At the end of 2008, 5 schemes were commissioned with a capacity of 3 MW DNC.

(d) Summary

7.1.18 In 1990, the first year of NFFO, projects contracted within NFFO accounted for about 32 per cent of the total capacity (excluding large-scale hydro). This percentage rose to a peak in 2001 of 91 per cent. Following the introduction of the Renewables Obligation it fell back as new capacity eligible for the RO outweighed the growth in NFFO 3, 4 and 5 and SRO and NI-NFFO projects, so that the NFFO capacity proportion (excluding large scale hydro) had decreased to 54 per cent in 2006 and fell further to 44 per cent in 2007, and again in 2008 to 37 per cent. Four new NFFO schemes were commissioned in 2006, but one scheme came to the end of its contract and 2 applied for economic termination making a net increase of 1 scheme. In 2007, 1 new NFFO scheme was commissioned, but 4 schemes came to the end of their contracts and 12 applied for economic termination making a net decrease of 15 schemes. This, along with capacity changes led to a net decrease totalling 66.8 MW (DNC) in 2007. AEA have reported that there are no changes to these figures for 2008. These trends are shown in Chart 7.1.2.

7.1.1 Renewable sources used to generate electricity and heat⁽¹⁾; electricity generated from renewable sources

Thousand tonnes of oil equivalent

	Wind and wave (2)	Solar photo-voltaics	Hydro		Landfill gas	Sewage sludge digestion (4)	Municipal solid waste combustion (5)	Biomass			Total biomass (8)	Total Wastes (9)	
			Small scale	Large scale (3)				Animal Biomass (6)	Plant Biomass (7)	Co-firing with fossil fuels			
Used to generate electricity													
1990	0.8	-	10.9	436.8	45.6	103.6	69.8	0.0	-	-	219.0	667.5	41.0
1991	0.7	-	12.2	385.4	68.2	107.6	70.5	0.6	-	-	246.9	645.2	41.4
1992	2.8	-	12.8	454.1	123.6	107.6	85.9	17.5	-	-	334.6	804.4	50.4
1993	18.7	-	13.6	356.2	146.6	123.8	119.1	52.4	-	-	442.0	830.5	76.4
1994	29.5	-	13.6	424.3	169.5	118.3	192.0	70.9	-	-	550.8	1,018.3	156.3
1995	33.7	-	14.2	401.7	184.3	134.6	198.6	71.2	-	-	588.7	1,038.4	178.6
1996	41.9	-	10.1	281.6	232.1	134.6	205.3	67.1	-	-	639.1	972.7	184.8
1997	57.4	-	14.1	344.4	301.1	133.7	258.2	67.9	-	-	760.8	1,176.6	236.0
1998	75.4	-	17.7	422.3	388.8	126.5	346.5	76.2	0.1	-	938.0	1,453.4	302.8
1999	73.1	-	17.8	441.0	558.4	134.6	345.0	156.8	0.2	-	1,195.0	1,726.9	272.5
2000	81.3	0.1	18.4	418.8	717.6	120.4	350.1	182.5	10.3	-	1,380.8	1,899.6	253.3
2001	83.0	0.2	18.1	330.7	822.2	119.0	387.1	205.3	76.8	-	1,610.5	2,042.4	266.2
2002	108.0	0.2	17.5	394.2	878.5	120.6	420.2	184.4	89.2	94.0	1,786.8	2,306.7	286.1
2003	110.5	0.3	12.9	256.9	1,074.5	129.3	445.8	172.4	131.8	197.3	2,151.3	2,531.8	273.8
2004	166.4	0.3	24.3	392.2	1,313.1	144.3	429.5	182.3	118.8	335.1	2,523.1	3,106.3	263.9
2005	249.7	0.7	38.2	385.0	1,407.2	154.3	426.3	161.5	125.2	830.7	3,105.1	3,778.7	262.0
2006	363.3	0.9	41.1	353.9	1,451.1	149.4	479.0	148.5	119.0	829.0	3,176.0	3,935.2	293.7
2007	453.5	1.2	46.0	391.6	1,533.9	162.5	486.8	222.5	134.1	641.4	3,181.2	4,073.4	298.3
2008	610.3	1.5	48.8	395.5	1,560.3	185.1	506.8	253.3	186.3	528.9	3,225.5	4,281.6	310.3

	Active solar heating (10)	Landfill gas	Sewage sludge digestion (4)	Biomass				Total biomass	Geo-thermal aquifers	Total	Wastes (15)	
				Wood combustion - domestic (11)	Wood combustion - industrial (12)	Animal Biomass (13)	Plant Biomass (14)					
Used to generate heat												
1990	6.4	34.2	34.6	174.1	-	0.2	71.7	31.1	345.8	0.8	353.1	41.1
1991	6.8	36.3	43.5	174.1	-	0.2	71.7	33.5	359.3	0.8	366.9	42.9
1992	7.1	31.5	43.5	204.2	-	0.3	71.7	30.8	381.9	0.8	389.9	49.1
1993	7.4	15.0	34.0	204.2	236.8	0.3	71.7	28.2	590.1	0.8	598.3	53.6
1994	7.7	18.9	52.1	204.2	455.1	0.3	71.7	29.5	831.8	0.8	840.3	60.6
1995	8.1	15.1	58.5	204.2	498.1	0.3	71.7	30.5	878.4	0.8	887.3	68.3
1996	8.7	16.6	58.5	204.2	505.5	0.3	71.7	31.9	888.6	0.8	898.1	63.1
1997	8.9	15.5	58.2	204.2	506.1	0.3	71.7	9.0	864.9	0.8	874.6	52.3
1998	9.1	13.6	54.1	204.2	436.9	0.3	71.7	15.2	796.0	0.8	805.9	49.6
1999	9.4	13.6	54.2	204.2	367.7	0.3	71.9	20.2	732.1	0.8	742.3	49.3
2000	11.1	13.6	48.3	204.2	254.2	0.3	71.9	24.7	617.1	0.8	629.0	76.4
2001	13.2	13.6	49.4	204.2	225.2	0.3	71.9	26.2	590.7	0.8	604.8	80.7
2002	16.1	13.6	53.4	204.2	225.2	0.3	71.9	33.7	602.4	0.8	619.3	92.2
2003	19.8	13.6	52.4	205.8	225.2	0.3	71.9	33.7	602.9	0.8	623.5	117.1
2004	24.6	13.6	54.8	232.4	225.2	2.0	71.9	33.7	633.6	0.8	659.0	115.7
2005	29.4	13.6	53.6	265.6	93.1	14.4	85.7	33.7	559.7	0.8	589.9	127.5
2006	36.3	13.6	45.7	298.8	97.0	24.9	87.3	33.7	601.1	0.8	638.2	111.6
2007	44.9	13.6	50.0	332.0	101.2	47.8	97.3	33.7	675.6	0.8	721.3	137.3
2008	55.7	13.6	59.6	358.6	107.6	42.4	127.5	31.5	740.7	0.8	797.2	153.7

	Solar heating and photovoltaics	Wind and wave	Hydro	Biomass	Geothermal aquifers	Liquid biofuels (16)	Total	Wastes
Total use of renewable sources								
1990	6.4	0.8	447.7	564.8	0.8	..	1,020.5	82.1
1991	6.8	0.7	397.6	606.2	0.8	..	1,012.1	84.3
1992	7.1	2.8	467.0	716.6	0.8	..	1,194.3	99.6
1993	7.4	18.7	369.9	1,032.1	0.8	..	1,428.9	130.0
1994	7.7	29.5	438.0	1,382.6	0.8	..	1,858.6	217.0
1995	8.1	33.7	415.9	1,467.1	0.8	..	1,925.7	247.0
1996	8.7	41.9	291.7	1,527.7	0.8	..	1,870.8	247.9
1997	8.9	57.4	358.4	1,625.7	0.8	..	2,051.2	288.3
1998	9.1	75.4	440.0	1,734.0	0.8	..	2,259.3	352.4
1999	9.4	73.1	458.8	1,927.1	0.8	..	2,469.2	321.8
2000	11.2	81.3	437.3	1,998.0	0.8	..	2,528.5	329.7
2001	13.4	83.0	348.7	2,201.2	0.8	..	2,647.2	347.0
2002	16.3	108.0	411.7	2,389.2	0.8	2.4	2,928.4	378.3
2003	20.0	110.5	269.8	2,754.2	0.8	15.1	3,170.4	390.9
2004	24.9	166.4	416.5	3,156.6	0.8	16.7	3,782.0	379.6
2005	30.1	249.7	423.2	3,664.8	0.8	74.1	4,442.6	389.5
2006	37.2	363.3	394.9	3,777.1	0.8	187.8	4,761.1	405.3
2007	46.1	453.5	437.5	3,856.8	0.8	361.7	5,156.4	435.6
2008	57.2	610.3	444.4	3,961.4	0.8	825.5	5,899.5	464.1

7.1.1 Renewable sources used to generate electricity and heat⁽¹⁾; electricity generated from renewable sources (continued)

	GWh											Total	Wastes
	Wind and wave	Solar photo-voltaics	Hydro		Biomass						Total biomass		
			Small scale	Large scale (3)	Landfill gas	Sewage sludge digestion	Municipal solid waste combustion (5)	Co-firing with fossil fuels	Animal Biomass (6)	Plant Biomass (7)			
Electricity generated													
1990	9	-	127	5,080	139	316	141	-	0	-	596	5,812	83
1991	9	-	142	4,482	208	328	150	-	1	-	688	5,320	88
1992	33	-	149	5,282	377	328	177	-	52	-	934	6,398	104
1993	217	-	159	4,143	447	378	252	-	122	-	1,198	5,717	165
1994	344	-	159	4,935	517	361	449	-	192	-	1,518	6,956	352
1995	392	-	166	4,672	562	410	471	-	199	-	1,642	6,871	412
1996	488	-	118	3,275	708	410	489	-	197	-	1,805	5,685	417
1997	667	-	164	4,005	918	408	585	-	199	0	2,110	6,945	483
1998	877	-	206	4,911	1,185	386	849	-	234	0	2,654	8,648	583
1999	850	1	207	5,128	1,703	410	856	-	459	1	3,429	9,616	559
2000	946	1	214	4,871	2,188	367	840	-	456	31	3,882	9,914	519
2001	965	2	210	3,845	2,507	363	880	-	542	234	4,526	9,549	528
2002	1,256	3	204	4,584	2,679	368	907	286	568	272	5,080	11,127	545
2003	1,285	3	150	2,987	3,276	394	965	602	535	402	6,174	10,600	579
2004	1,935	4	283	4,561	4,004	440	971	1,022	565	362	7,364	14,147	583
2005	2,904	8	444	4,478	4,290	470	964	2,533	468	382	9,107	16,940	578
2006	4,225	11	478	4,115	4,424	456	1,083	2,528	434	363	9,288	18,116	651
2007	5,274	14	534	4,554	4,677	496	1,177	1,956	555	409	9,270	19,646	707
2008	7,097	17	568	4,600	4,757	564	1,226	1,613	587	568	9,315	21,597	736

	Wind and wave		Solar photo-voltaics		Hydro		Biomass and wastes				Total
			Small scale	Large scale (3)	Landfill gas	Sewage sludge digestion	Municipal solid waste combustion	Animal Biomass (17)	Plant Biomass (18)	Total biomass and wastes	
Declared net capacity											
1990	4.3	-	26.3	1,084.0	16.5	72.7	30.9	0.1	-	120.3	1,234.8
1991	6.3	-	37.9	1,377.1	28.7	91.4	30.9	0.3	-	151.3	1,572.7
1992	21.3	-	40.3	1,383.0	51.1	91.4	44.6	12.9	-	200.0	1,644.5
1993	55.2	-	42.2	1,383.0	78.7	88.4	49.8	25.6	20.0	262.5	1,743.0
1994	65.7	-	42.2	1,383.0	84.9	87.1	86.8	25.6	20.0	304.4	1,795.3
1995	85.1	0.2	48.6	1,383.0	94.7	87.2	86.8	25.5	20.0	314.2	1,831.1
1996	113.0	0.3	49.1	1,405.8	145.7	87.2	115.0	25.5	20.0	393.4	1,961.6
1997	135.4	0.5	58.5	1,428.8	169.4	86.8	115.0	25.5	20.1	416.8	2,039.9
1998	139.4	0.6	61.6	1,413.0	220.6	89.8	162.1	63.9	20.3	556.7	2,171.3
1999	150.5	1.2	63.6	1,413.0	309.0	91.3	160.6	63.9	20.3	645.1	2,273.4
2000	176.8	2.0	66.1	1,419.0	382.6	85.3	184.0	73.7	59.3	784.9	2,448.7
2001	183.6	2.8	67.9	1,440.0	418.3	85.0	188.9	73.7	59.3	825.2	2,519.5
2002	225.1	4.1	70.3	1,388.8	439.2	96.0	202.7	76.7	78.5	893.0	2,581.4
2003	312.4	6.0	47.1	1,354.5	575.1	123.7	212.3	78.1	84.5	1,073.7	2,793.7
2004	392.7	8.2	51.7	1,355.9	670.9	131.9	218.5	71.8	84.8	1,178.0	2,986.4
2005	658.4	10.9	57.2	1,343.2	759.7	139.6	228.7	71.9	94.5	1,294.5	3,364.1
2006	821.9	14.3	55.5	1,361.4	795.4	146.4	237.3	74.2	127.3	1,380.5	3,633.6
2007	1,041.6	18.1	60.2	1,358.7	836.7	150.0	237.3	98.1	184.3	1,506.4	3,984.9
2008	1,432.1	22.5	62.7	1,456.5	843.8	152.2	273.3	98.1	188.1	1,555.6	4,529.4

- (1) Includes some waste of fossil fuel origin.
- (2) For wind, wave and hydro, the figures represent the energy content of the electricity supplied, but for biofuels the figures represent the energy content of the fuel used.
- (3) Excluding pumped storage stations.
- (4) No estimate is made for digestors where gas is used to heat the sludge.
- (5) Biodegradable part only.
- (6) Includes electricity from farm waste digestion, poultry litter combustion, meat and bone combustion.
- (7) Includes electricity from straw and energy crops.
- (8) Total includes liquid biofuels used to generate electricity (4.8 thousand tonnes of oil equivalent in 2008).
- (9) Non-biodegradable part of municipal solid waste plus waste tyres, hospital waste, and general industrial waste.
- (10) Based on a survey carried out in 1995 and updated using data from the Solar Trade Association.
- (11) An approximate estimate of domestic combustion based on a survey carried out in 1989 but updated by further surveys carried out in 1997, 2001, 2005 and 2009; a moisture content of 50 per cent is assumed.
- (12) Estimates updated using a survey carried out in 2006.
- (13) Includes heat from farm waste digestion, meat & bone combustion and sewage sludge combustion.
- (14) Includes heat from straw, energy crops and paper & packaging.
- (15) Includes heat from waste tyre combustion, hospital waste combustion, and general industrial waste combustion.
- (16) Liquid biofuels are generally blended for use in transport, although a small amount (see footnote 8) was used for electricity generation.
- (17) Includes the use of farm waste digestion, waste tyres, poultry litter, meat and bone.
- (18) Includes the use of waste tyres, straw combustion, short rotation coppice and hospital waste.

7.1.2 Renewable orders and operational capacity

Technology band	Contracted projects		1998 Live projects operational at 31 December 1998 (1)		1999 Live projects operational at 31 December 1999 (1)		
	Number	Capacity MW	Number	Capacity MW	Number	Capacity MW	
England and Wales							
NFFO - 1 (1990)	Hydro	26	11.85	21	10.00	21	10.00
	Landfill gas	25	35.50	19	30.78	19	30.78
	Municipal and industrial waste	4	40.63	4	40.63	4	40.63
	Other	4	45.48	4	45.48	4	45.48
	Sewage gas	7	6.45	6	5.98	6	5.98
	Wind	9	12.21	7	11.66	7	11.66
	Total (2)	75	152.12	61	144.53	61	144.53
NFFO - 2 (late 1991)	Hydro	12	10.86	10	10.46	10	10.46
	Landfill gas	28	48.45	26	46.39	26	46.39
	Municipal and industrial waste	10	271.48	2	31.50	2	31.50
	Other	4	30.15	1	12.50	1	12.50
	Sewage gas	19	26.86	18	19.06	18	19.06
	Wind	49	84.43	25	53.83	25	53.83
	Total (2)	122	472.23	82	173.74	82	173.74
NFFO - 3 (1995)	Energy crops and agricultural and forestry waste - gasification	3	19.06	-	-	-	-
	Energy crops and agricultural and forestry waste - other	6	103.81	1	38.50	1	38.50
	Hydro	15	14.48	6	9.72	7	10.08
	Landfill gas	42	82.07	40	78.96	42	82.07
	Municipal and industrial waste	20	241.87	5	75.32	6	77.42
	Wind - large	31	145.92	7	32.46	8	34.76
	Wind - small	24	19.71	7	5.38	9	7.93
	Total	141	626.92	66	240.34	73	250.76
NFFO - 4 (1997)	Hydro	31	13.22	3	0.70	5	1.42
	Landfill gas	70	173.68	21	45.93	43	103.30
	Municipal and industrial waste - CHP	10	115.29	-	-	-	-
	Municipal and industrial waste - fluidised bed combustion	6	125.93	-	-	-	-
	Wind - large	48	330.36	-	-	-	-
	Wind - small	17	10.33	-	-	1	0.63
	Anaerobic digestion of agricultural waste	6	6.58	-	-	-	-
	Energy crops and forestry waste gasification	7	67.34	-	-	-	-
	Total	195	842.73	24	46.63	49	105.35
NFFO - 5 (1998)	Hydro	22	8.87	-	-	-	-
	Landfill gas	141	313.73	1	1.78	11	16.58
	Municipal and industrial waste	22	415.75	-	-	-	-
	Municipal and industrial waste - CHP	7	69.97	-	-	-	-
	Wind - large	33	340.16	-	-	-	-
	Wind - small	36	28.67	-	-	2	1.69
	Total	261	1,177.15	1	1.78	13	18.27
NFFO Total		794	3,271.15	234	607.02	278	692.64
Scotland							
SRO - 1 (1994)	Biomass	1	9.8	-	-	-	-
	Hydro	15	17.25	3	2.27	4	3.22
	Waste to Energy	2	3.78	2	3.78	2	3.78
	Wind	12	45.6	6	21.76	7	25.13
	Total	30	76.43	11	27.81	13	32.13
SRO - 2 (1997)	Biomass	1	2	-	-	-	-
	Hydro	9	12.36	-	-	-	-
	Waste to Energy	9	56.05	-	-	3	6.7
	Wind	7	43.36	-	-	-	-
	Total	26	114.04	-	-	3	6.7
SRO - 3 (1999)	Biomass	1	12.9	-	-	-	-
	Hydro	5	3.9	-	-	-	-
	Waste to Energy	16	49.11	-	-	-	-
	Wave	3	2	-	-	-	-
	Wind - large	11	63.43	-	-	-	-
	Wind - small	17	14.06	-	-	-	-
	Total	53	145.40	-	-	-	-
SRO Total		109	335.87	11	14.55	16	38.83
Northern Ireland							
NI NFFO - 1 (1994)	Hydro	9	2.37	7	1.89	7	1.89
	Sewage gas	5	0.56	-	-	-	-
	Wind	6	12.66	6	12.66	6	12.66
	Total	20	15.59	13	14.55	13	14.55
NI NFFO - 2 (1996)	Biogas	1	0.25	-	-	-	-
	Biomass	2	0.3	2	0.30	2	0.30
	Hydro	2	0.25	1	0.08	1	0.08
	Landfill gas	2	6.25	-	-	-	-
	Municipal and industrial waste	1	6.65	-	-	-	-
	Wind	2	2.57	-	-	1	0.43
	Total	10	16.27	3	0.38	4	0.81
NI NFFO Total		30	31.86	16	14.93	17	15.36
All NFFO and equivalents (2)		933	3,638.88	261	649.76	311	746.83

(1) Sites that have closed and sites that are not currently using renewables as fuel have been excluded.

(2) The NFFO database has reported that at the end of December 2008 477 sites totalling 1,201.52 MW had gone live under NFFO, but this includes all NFFO-1 and NFFO-2 sites for England and Wales, some of which have closed or are not currently using renewables as fuels. The following table compares the totals for live projects, above, with the overall NFFO total:

	Number	MW
All live NFFO and equivalents	434	1142.44
NFFO-1 no longer classed as live and operational	17	12.85
NFFO-2 no longer classed as live and operational	8	12.76
NFFO-3 no longer classed as live and operational	7	1.52
NFFO-4 no longer classed as live and operational	2	-0.10
NFFO-5 no longer classed as live and operational	5	12.45
SRO-1 no longer classed as live and operational	2	10.46
SRO-3 no longer classed as live and operational	2	9.14
All NFFO and equivalents	477	1201.52

7.1.2 Renewable orders and operational capacity (continued)

2000		2001		2002		2003		2004	
Live projects operational at 31 December 2000 (1)		Live projects operational at 31 December 2001 (1)		Live projects operational at 31 December 2002 (1)		Live projects operational at 31 December 2003 (1)		Live projects operational at 31 December 2004 (1)	
Number	Capacity MW	Number	Capacity MW	Number	Capacity MW	Number	Capacity MW	Number	Capacity MW
19	8.75	21	10.00	9	2.95	9	7.63	13	8.19
19	30.78	19	30.78	8	16.56	17	29.32	13	25.09
3	37.08	4	40.63	4	44.62	4	40.63	4	40.63
4	45.48	4	45.48	2	25.38	2	25.38	3	45.38
6	5.98	6	5.98	2	8.67	6	5.98	4	1.55
7	11.66	5	8.14	1	2.06	2	5.81	3	7.53
58	139.73	59	141.01	26	100.24	40	114.74	40	128.37
10	10.46	10	10.46	1	0.07	2	2.78	8	10.16
26	46.39	26	46.39	13	22.33	26	46.39	22	35.67
2	31.50	2	31.50	2	31.50	2	31.50	2	31.50
1	12.50	1	12.50	1	12.50	-	-	1	12.50
18	19.06	18	19.06	16	14.22	17	18.39	17	25.69
24	52.53	23	52.45	23	52.45	21	52.20	23	52.45
81	172.44	80	172.36	56	133.07	68	151.26	73	167.97
1	8.00	1	8.00	-	-	-	-	-	-
2	69.50	2	69.50	2	69.50	2	69.50	2	69.50
8	11.74	8	11.74	8	11.74	8	11.74	8	11.74
42	82.07	42	82.07	42	82.07	42	82.07	42	82.07
6	77.42	6	77.42	6	77.42	7	89.12	8	102.92
9	36.81	10	41.02	10	41.02	10	41.02	10	41.02
9	7.93	10	9.47	11	10.84	13	11.86	13	11.86
77	293.47	79	299.22	79	292.58	82	305.31	83	319.11
5	1.42	7	2.10	8	2.30	9	2.49	9	2.49
51	135.71	51	135.71	55	141.73	57	146.00	60	148.36
2	14.98	2	14.98	4	33.48	4	33.48	4	33.48
-	-	-	-	-	-	-	-	-	-
1	2.53	1	2.53	4	12.97	4	12.97	4	12.97
3	2.03	4	2.76	5	3.27	5	3.27	5	3.27
-	-	-	-	1	1.43	1	1.43	1	1.43
-	-	-	-	-	-	-	-	-	-
62	156.67	65	158.08	77	195.18	80	199.64	83	202.00
23	53.88	3	0.64	3	0.64	3	0.64	-	-
-	-	45	89.60	58	114.50	67	137.26	77	164.32
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
2	1.69	4	3.65	4	3.65	6	4.85	9	7.45
25	55.57	52	93.89	65	118.79	76	142.75	86	171.77
303	817.88	335	864.55	303	839.86	346	913.70	365	989.21
1	9.80	1	9.80	1	9.80	1	9.80	1	9.80
6	4.04	6	4.04	8	7.82	9	8.81	9	8.81
2	3.78	2	3.78	2	3.78	2	3.78	2	3.78
7	25.13	7	25.13	7	25.13	7	25.13	7	25.13
16	42.75	16	42.75	18	46.53	19	47.52	19	47.52
-	-	-	-	-	-	-	-	-	-
4	15.00	2	1.46	2	1.46	2	1.46	2	1.46
-	-	4	15.00	4	15.00	6	17.65	6	17.65
-	-	3	18.95	5	31.29	5	31.29	5	31.29
4	15.00	9	35.41	11	47.75	13	50.40	13	50.40
-	-	-	-	-	-	-	-	-	-
1	3.94	2	6.12	4	10.30	7	16.04	10	22.36
-	-	1	0.20	1	0.20	1	0.20	1	0.20
1	8.29	1	8.29	1	8.29	1	8.29	1	8.29
2	1.62	3	2.47	3	2.47	5	4.28	5	4.28
4	13.85	7	17.08	9	21.26	14	28.81	17	35.13
24	71.60	32	95.24	38	115.54	46	126.73	49	133.05
7	1.89	7	1.89	8	2.33	8	2.33	8	2.33
-	-	-	-	-	-	-	-	-	-
6	12.66	6	12.66	6	12.66	6	12.66	6	12.66
13	14.55	13	14.55	14	14.99	14	14.99	14	14.99
-	-	-	-	-	-	-	-	-	-
2	0.30	2	0.30	2	0.30	2	0.30	2	0.30
1	0.08	1	0.08	1	0.08	1	0.08	1	0.08
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
2	2.57	2	2.57	2	2.57	2	2.57	2	2.57
5	2.95	5	2.95	5	2.95	5	2.95	5	2.95
18	17.50	18	17.5	19	17.94	19	17.94	19	17.94
345	907.00	385	977.29	360	973.34	411	1,058.37	433	1,140.20

7.1.2 Renewable orders and operational capacity (continued)

2005		2006		2007		2008		Technology band
Live projects operational at 31 December 2005 (1)		Live projects operational at 31 December 2006 (1)		Live projects operational at 31 December 2007 (1)		Live projects operational at 31 December 2008 (1)		
Number	Capacity MW	Number	Capacity MW	Number	Capacity MW	Number	Capacity MW	
England and Wales								
13	4.83	13	4.83	13	4.83	13	4.83	Hydro
13	25.09	13	25.09	13	25.09	13	25.09	Landfill gas
4	40.63	4	40.63	4	40.63	4	40.63	Municipal and industrial waste
3	45.38	3	45.38	3	45.38	3	45.38	Other
4	4.08	4	4.08	4	4.08	4	4.08	Sewage gas
5	8.14	5	8.14	5	8.14	5	8.14	Wind
42	128.16	42	128.16	42	128.16	42	128.16	Total (2)
9	10.43	9	10.43	9	10.43	9	10.43	Hydro
21	34.64	21	34.64	21	34.64	21	34.64	Landfill gas
2	31.50	2	31.50	2	31.50	2	31.50	Municipal and industrial waste
1	12.50	1	12.50	1	12.50	1	12.50	Other
17	18.56	17	18.56	17	18.56	17	18.56	Sewage gas
22	51.97	22	51.97	22	51.97	22	51.97	Wind
72	159.60	72	159.60	72	159.60	72	159.60	Total (2)
-	-	-	-	-	-	-	-	Energy crops and agricultural and forestry waste - gasification
2	69.50	2	69.50	1	31.00	1	31.00	Energy crops and agricultural and forestry waste - other
8	11.74	8	11.74	8	11.74	8	11.74	Hydro
41	80.55	40	79.03	35	71.08	35	71.08	Landfill gas
9	114.62	9	126.32	9	126.32	9	126.32	Municipal and industrial waste
12	50.50	12	50.50	12	50.50	12	50.50	Wind - large
15	13.52	15	13.52	15	13.52	15	13.52	Wind - small
87	340.43	86	350.61	80	304.16	80	304.16	Total
9	2.49	9	2.49	9	2.49	9	2.49	Hydro
62	161.46	62	160.51	60	158.95	60	158.95	Landfill gas
4	33.48	4	33.48	4	33.48	4	33.48	Municipal and industrial waste - CHP
-	-	-	-	-	-	-	-	Municipal and industrial waste - fluidised bed combustion
6	38.67	6	38.67	7	42.72	7	42.72	Wind - large
6	4.03	6	4.03	6	4.03	6	4.03	Wind - small
1	1.43	1	1.43	-	-	-	-	Anaerobic digestion of agricultural waste
-	-	-	-	-	-	-	-	Energy crops and forestry waste gasification
88	241.57	88	240.62	86	241.67	86	241.67	Total
-	-	-	-	-	-	-	-	Hydro
80	170.41	84	180.49	79	168.04	79	168.04	Landfill gas
-	-	-	-	-	-	-	-	Municipal and industrial waste
-	-	-	-	-	-	-	-	Municipal and industrial waste - CHP
-	-	-	-	-	-	-	-	Wind - large
9	7.45	9	7.45	9	7.45	9	7.45	Wind - small
89	177.86	93	187.94	88	175.49	88	175.49	Total
378	1,047.61	381	1,066.92	368	1,009.07	368	1,009.07	NFFO Total
Scotland								
1	9.80	-	-	-	-	-	-	Biomass
10	10.75	10	10.75	9	10.09	9	10.09	Hydro
2	3.78	2	3.78	2	3.78	2	3.78	Waste to Energy
7	25.13	7	25.13	7	25.13	7	25.13	Wind
20	49.46	19	39.66	18	39.00	18	39.00	Total
-	-	-	-	-	-	-	-	Biomass
2	1.46	2	1.46	2	1.46	2	1.46	Hydro
6	17.65	6	17.65	6	17.65	6	17.65	Waste to Energy
5	31.29	5	31.29	5	31.29	5	31.29	Wind
13	50.40	13	50.40	13	50.40	13	50.40	Total
-	-	-	-	-	-	-	-	Biomass
-	-	-	-	-	-	-	-	Hydro
10	22.36	10	22.36	10	22.36	10	22.36	Waste to Energy
1	0.20	1	0.20	1	0.20	1	0.20	Wave
1	8.29	1	8.29	-	-	-	-	Wind - large
5	4.28	4	3.43	4	3.43	4	3.43	Wind - small
17	35.13	16	34.28	15	25.99	15	25.99	Total
50	134.99	48	124.34	46	115.39	46	115.39	SRO Total
Northern Ireland								
9	2.37	9	2.37	9	2.37	9	2.37	Hydro
-	-	-	-	-	-	-	-	Sewage gas
6	12.66	6	12.66	6	12.66	6	12.66	Wind
15	15.03	15	15.03	15	15.04	15	15.04	Total
-	-	-	-	-	-	-	-	Biogas
2	0.30	2	0.30	2	0.30	2	0.30	Biomass
1	0.08	1	0.08	1	0.08	1	0.08	Hydro
-	-	-	-	-	-	-	-	Landfill gas
-	-	-	-	-	-	-	-	Municipal and industrial waste
2	2.57	2	2.57	2	2.57	2	2.57	Wind
5	2.95	5	2.95	5	2.95	5	2.95	Total
20	17.98	20	17.98	20	17.98	20	17.98	Ni NFFO Total
448	1,200.59	449	1,209.24	434	1,142.44	434	1,142.44	All NFFO and equivalents (2)