Department of Energy & Climate Change

A National Statistics Publication

DIGEST OF UNITED KINGDOM ENERGY STATISTICS 2014

Department
of Energy &
Climate Change

Digest of United Kingdom Energy Statistics 2014

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Digest of United Kingdom Energy Statistics

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This is a National Statistics publication

The United Kingdom Statistics Authority has designated these statistics as National Statistics, in accordance with the Statistics and Registration Service Act 2007 and signifying compliance with the UK Statistics Authority: Code of Practice for Official Statistics.

Designation can be broadly interpreted to mean that the statistics:

- meet identified user needs
- are well explained and readily accessible
- are produced according to sound methods, and
- are managed impartially and objectively in the public interest

Once statistics have been designated as National Statistics it is a statutory requirement that the Code of Practice shall continue to be observed.

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Monthly and quarterly data are also available for Energy, Solid fuels and derived gases, Petroleum, Gas, Electricity and Renewables at:
www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics

Information on Energy Prices is available at:
www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics#energy-price-statistics

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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). A publication tracing the history of energy production and use over the past 60 years was produced in 2009 to mark the 60th anniversary of DUKES. The publication is available at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

II The current issue updates the figures given in the Department of Energy and Climate Change's (DECC) *Digest of United Kingdom Energy Statistics 2013*, published in July 2013.

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, renewable sources of energy and combined heat and power. 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 2010 are included on the internet, and tables that show five years in this printed version show sixteen 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 2014 - Annex D
(only Major events for 2012 to 2014 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. The data are also available on the DECC section of the gov.uk website. 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 6 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 Ricardo-AEA on behalf of DECC which complement work undertaken by DECC. These chapters estimate the contribution made by renewable energy sources to energy and combined heat and power (CHP) 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. Further information on methodologies are also provided on the DECC section of the gov.uk website for each fuel at:
www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics.

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 5.66 to 5.72.

XV Data in this issue have been prepared on the basis of the Standard Industrial Classification (SIC 2007) as far as is practicable. For further details of classification of consumers see Chapter 1, paragraphs 1.56 to 1.60.

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 calorifc 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. However, within UK trade statistics, 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, from the UK, 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 2013 Digest, even though some figures may have been amended on the internet version of the tables. A table showing the size of revisions to key aggregates is available (Chapter 1, table 1J). 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, and 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 (i.e. in July 2014 when this Digest is published, revisions can be made to 2012 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 (e.g. 2014) are published in *Energy Trends* in March of the following year (e.g. March 2015), percentage growth rates are liable to be distorted if the prior year (i.e. 2013) data are constrained to the Digest total, when revisions are known to be required. In these circumstances the prior year (i.e. 2013) 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 2014 data published in *Energy Trends* prior to publication in the 2015 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. DECC's statements of compliance with the Code are available at: www.gov.uk/government/collections/decc-statistics-governance. The UK Statistics Authority undertake regular assessments of DECC's energy statistics and their reports can be accessed at: www.statisticsauthority.gov.uk/assessment/assessment-reports/index.html. The authority's recommendations have been incorporated into this publication and other DECC energy statistical publications and outputs.

Energy data on the internet

XXI Energy data are held on the DECC section of the gov.uk website, under "statistics". The Digest is available at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes. 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;
- quarterly, by DECC in paper and on the internet in *Energy Trends,* and *Quarterly Energy Prices;*
- quarterly, by DECC in a Statistical Press Release which provides a summary of information published in *Energy Trends* and *Quarterly Energy Prices* publications;

To subscribe to *Energy Trends* and *Quarterly Energy Prices,* please contact Kevin Harris 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 not separately available
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 International Steel Statistics Bureau, Ricardo-AEA, 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 2014

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

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	-	1.1	1.2	1.3
	1.1	1.2	1.3	-
	1.2	1.3	-	-
	1.3	-	-	-
	-	-	-	1.4
	-	-	1.4	1.5
	-	1.4	1.5	1.6
	1.4	1.5	1.6	-
	1.5	1.6	-	-
	1.6	-	-	-
	1.7	1.7	1.7	1.7
	1.8	1.8	1.8	1.8
	1.9	1.9	1.9	1.9
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	-	-	2.1	2.2
	-	2.1	2.2	2.3
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	2.2	2.3	-	-
	2.3	-	-	-
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	-	3.1	3.1	3.1
	3.1	3.1	3.1	-
	3.1	3.1	-	-
	3.1	-	-	-
	-	-	-	3.2
	-	-	3.2	3.3
	-	3.2	3.3	3.4
	3.2	3.3	3.4	-
	3.3	3.4	-	-
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Chapter 1
Energy

Key points

- In 2013, UK energy production was down 6.3 per cent on a year earlier, due to record low coal output following mine closures; oil and gas output was also down as production facilities were affected by maintenance issues, alongside longer term decline. (Tables 1.1 and 1.2).
- Imports in 2013 were at a record high level, with exports at their lowest level since 1980. Net imports increased and accounted for 47 per cent of energy used in the UK. In 2013, the UK became a net importer of petroleum products for the first time since 1973, largely due to the closure of the Coryton refinery in July 2012.
- Primary energy consumption was down 0.6 per cent; and on a temperature adjusted basis primary energy consumption was down 1.9 per cent continuing the downward trend of the last eight years. In 2013 the average UK temperature was 9.7 degrees Celsius, with colder winter weather compared to 2012 (Table 1.1.7).
- Final energy consumption rose by 0.7 per cent with more energy used for heating (more details are available in Energy Consumption in the UK: www.gov.uk/government/collections/energy-consumption-in-the-uk) though temperature adjusted final energy consumption was down 0.3 per cent.
- Fossil fuels remain the dominant source of energy supply, accounting for 86.2 per cent, though this is a record low level. Supply from renewables increased, with its contribution accounting for 5.2 per cent of final consumption on the EU agreed basis (see Chapter 6).
- In 2013, there was a switch in the main sources of electricity generation away from the fossil fuels of coal and gas to more low carbon generation. Generation from coal fell by 8.7 per cent, as a number of plants closed or switched to burning biomass; gas fell by 4.5 per cent due to high gas prices; with overall renewables share of generation up by 30 per cent to a record 14.9 per cent share of generation.

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 6.

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, 2013. 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.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

Calorific values when producing energy statistics

1.3 In this publication Gross Calorific Values (GCVs) are used to convert fuel from their original units to tonnes of oil equivalent (toe). An alternative is to use Net Calorific Values (NCVs) as detailed in paragraph XVII of the introduction. The fuel specific GCVs and NCVs are shown at Annex A. However, as the 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; these are used in Table 6.7, and are available on the internet version, Annex I, of this publication at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes.

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 2013, based on the latest available data from the Office for National Statistics (ONS):

- 3.3 per cent of GDP;
- 18 per cent of total investment;
- 56 per cent of industrial investment in 2013;
- 169,000 people directly employed (6.2 per cent of industrial employment);
- Many others indirectly employed (e.g. an estimated 200,000 in support of UK Continental Shelf activities).

1.5 The share of GDP at 3.3 per cent compares to a peak level of 10.4 per cent in 1982. The share fell to below 4 per cent in most years since 2000, with the latest fall largely due to the decline in oil and gas production. In the last 10 years investment has grown sharply, though levels in 2013 are provisionally estimated to have fallen back slightly from last year's peak. Employment has remained broadly unchanged in the last four years, but up from 10 years ago.

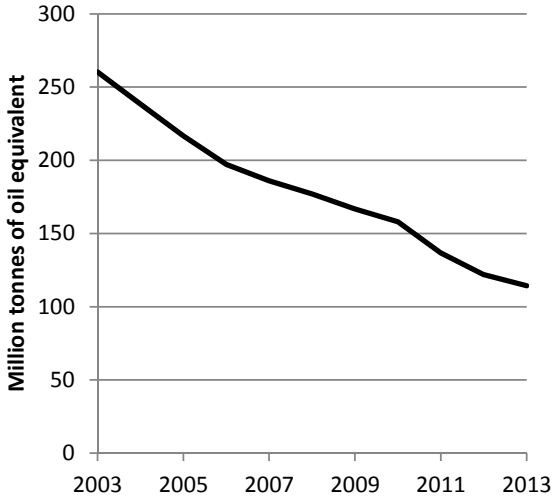
Aggregate energy balance (Tables 1.1, 1.2 and 1.3)

1.6 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 (toe), a unit of energy where 1 toe = 41.868 GJ, see also paragraph 1.29 for other energy units.

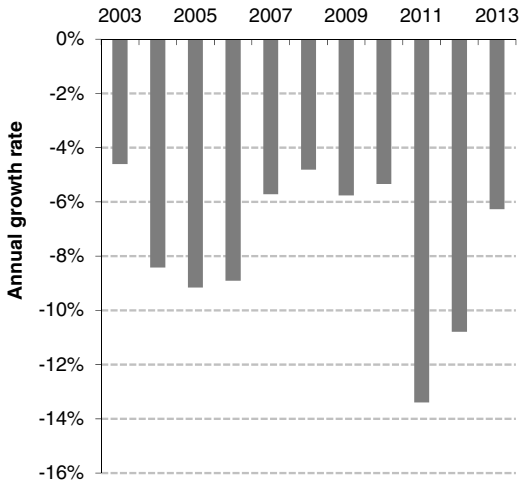
1.7 In 2013, the primary supply of fuels was 213.5 million tonnes of oil equivalent (mtoe), a 0.5 per cent decrease compared to 2012. Indigenous production in 2013 was down 6.3 per cent on the low level in 2012. UK energy production has fallen in each year since 1999 (chart 1.1), due to the longer term decline in UK Continental Shelf (UKCS) output, and is down by 62 per cent over this period. The fall in 2013, which was more in line with the long term trend, follows the sharp falls in both 2011 and 2012 that were mainly due to reduced production from the UKCS as a number of oil and gas production facilities were affected by maintenance issues. Coal production declined sharply in 2013, down 25 per cent on a year earlier, due to mine closures and geological issues affecting a number of other sites. Oil and gas production both fell, by 8.8 and 6.2 per cent respectively. However, output of primary electricity increased with wind generation up by 45 per cent. More details on these are given in the later fuel specific chapters.

Chart 1.1: UK energy production

Level

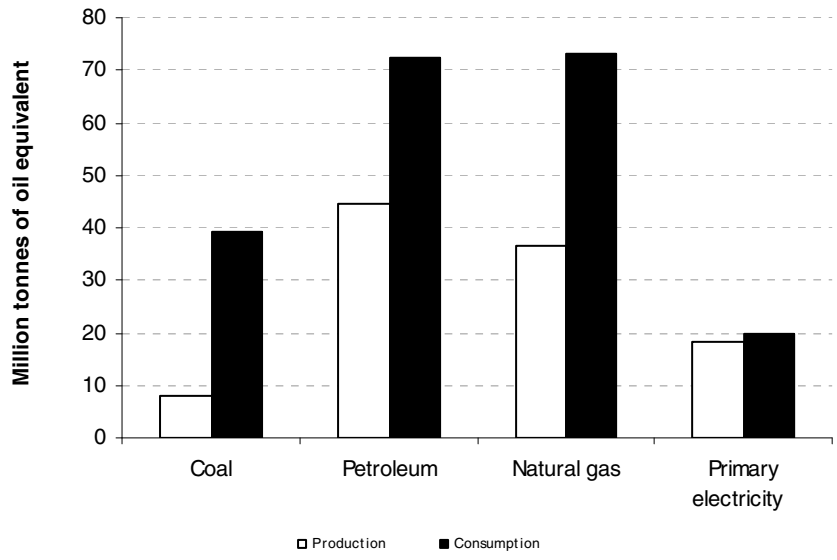


Annual growth rate



1.8 Chart 1.2 illustrates the figures for the production and consumption of individual primary fuels in 2013. In 2013, 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. Imports in 2013 were at a record high level of 178 million toe, with exports at 76.2 million toe at their lowest level since 1980. In 2013 the UK became a net importer of petroleum products for the first time since 1973. This switch from net exporter to importer is largely due to the closure of the Coryton refinery in July 2012, with the UK both increasing imports of petroleum products and reducing exports in 2013, more details are available in chapter 3. The UK was a net importer of all fuel types in 2013. In 2013 the UK net import gap was 102 million toe; its highest level since 1974. Net imports accounted for 47 per cent of energy used in the UK in 2013.

Chart 1.2: Production and consumption of primary fuels 2013



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.

1.9 Total primary energy demand was 0.4 per cent lower in 2013 than in 2012 at 213.9 mtoe. The very small difference between demand and supply is classed as the statistical difference, which is explained in paragraph 1.62. The small decrease in demand occurred despite temperatures in 2013 being slightly lower resulting in increased demand for heating. There has been a general trend since 2005 for underlying demand to fall. Primary energy consumption (primary supply less non-energy use) was down by 0.6 per cent in 2013. On a temperature corrected basis, primary energy consumption was estimated to have fallen by just under 2.0 per cent. A table showing temperature corrected demand is shown in Table 1.1.4 in the internet annex on long term trends, while Chart 1.3 shown below, shows the continued fall in primary energy consumption. Chart 1.4 shows the composition of primary demand in 2013.

Chart 1.3: Primary energy consumption

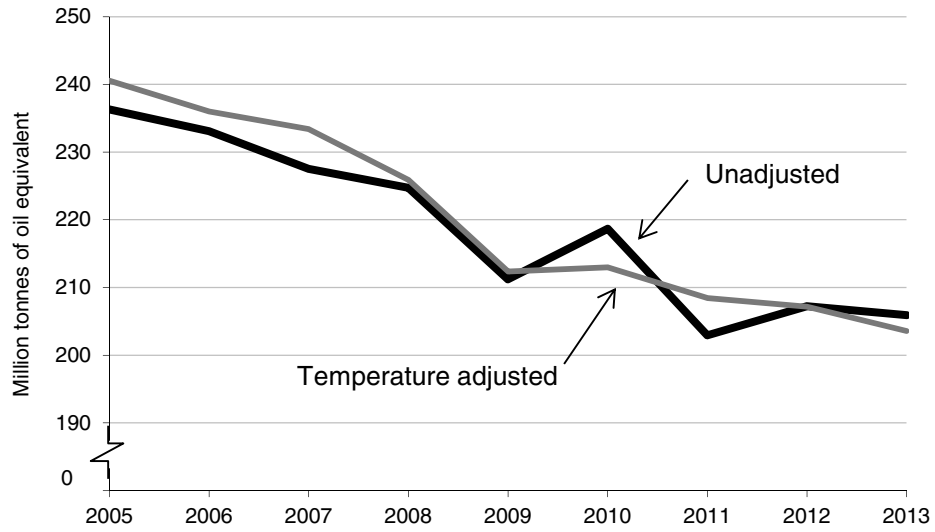
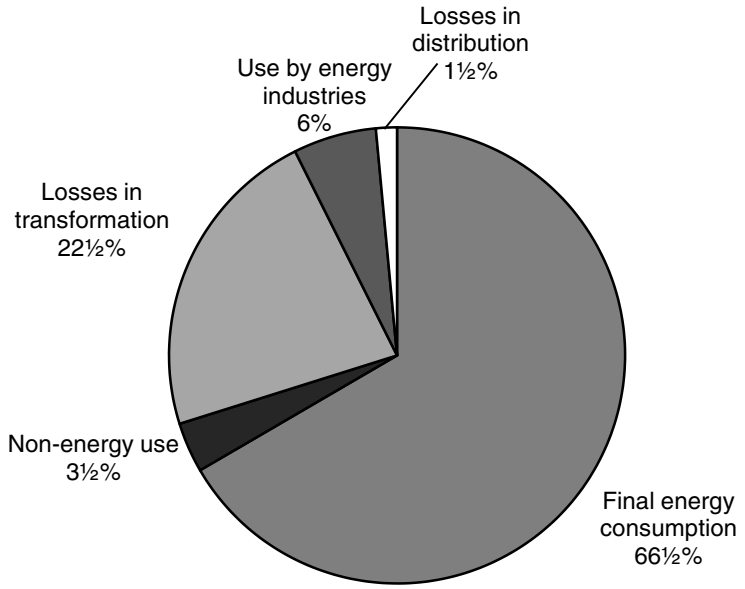


Chart 1.4: Primary demand 2013



Primary demand: 213.9 million tonnes of oil equivalent

1.10 The transformation section of the energy balance shows, for each fuel, the net inputs for transformation uses. For example, Table 1.1 shows that 4,020 thousand tonnes of oil equivalent of coal feeds into the production of 3,574 thousand tonnes of oil equivalent of coke, representing a loss of 446 thousand tonnes of oil equivalent in the manufacture of coke in 2013. In 2013, energy losses during the production of electricity and other secondary fuels amounted to 48.1 million tonnes of oil equivalent, (23 per cent of primary supply) shown in the transformation row in Table 1.1.

1.11 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.

1.12 In 2013, there was a switch in the main sources of electricity generation away from the fossil fuels of coal and gas to more low carbon generation. Generation from coal fell by 8.7 per cent, as a number of plants closed or switched to burning biomass. Gas fell by 4.5 per cent in 2013, and is now down by nearly 50 per cent compared to 2010, as high gas prices have reduced the attractiveness of the fuel for generation; prices paid by major power producers are up by 57 per cent compared to 2010 levels (Table 3.2.1 of DECC's *Quarterly Energy Prices*). Generation from nuclear sources increased slightly in 2013. Generation from wind increased sharply with 26 per cent greater capacity and higher wind speeds resulting in output rising by 45 per cent. Onshore wind was up 40 per cent, with offshore up by 52 per cent. Hydro output was down due to lower rainfall where the main UK hydro stations are located. Overall renewables share of generation increased by 30 per cent to a record 14.9 per cent share of generation. More details are available in Chapter 6.

1.13 The reduction in fossil fuels for electricity generation contributed to a decrease in carbon dioxide emissions between 2012 and 2013. Provisional DECC estimates suggest that overall emissions fell by 9.8 million tonnes of carbon dioxide ($MtCO_2$) (2.1 per cent) to 464.3 MtCO2 between 2012 and 2013. The reduction in emissions from power stations was larger than the total, but was partially offset by increased emissions as heating demand increased reflecting the colder weather in 2013. More details of carbon dioxide emissions are available in a Statistical Release, published in March, which is available on the DECC website at: www.gov.uk/government/collections/uk-greenhouse-gas-emissions.

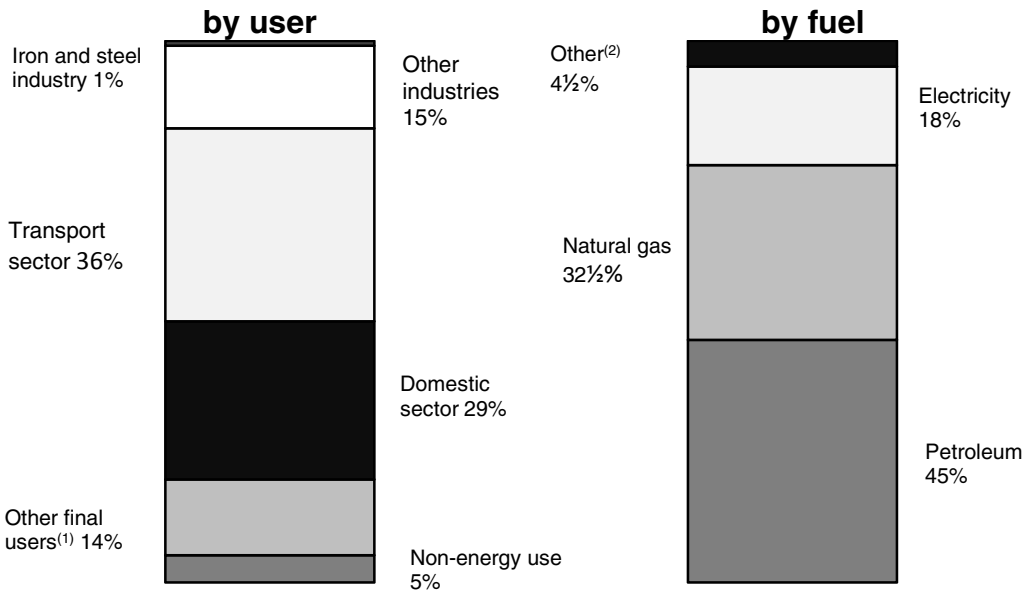
1.14 The energy industry use section of the table represents use of fuels by the energy industries themselves. This section also includes consumption by those parts of the iron and steel industry which behave like an energy industry i.e. they are involved in the transformation processes (see paragraph A.20 of Annex A). In 2013, energy industry use amounted to 12.6 million tonnes of oil equivalent of energy (6 per cent of primary demand), continuing a general decline matching the fall in UK energy production.

1.15 Losses presented in the energy balance include distribution and transmission losses in the supply of manufactured gases, natural gas, and electricity. Recorded losses fell by 2.2 per cent between 2012 and 2013.

1.16 Total final consumption, which includes non-energy use of fuels, was 150.1 million tonnes of oil equivalent in 2013; this is a 1.2 million tonnes of oil equivalent increase, 0.8 per cent up, on the consumption in 2012. Consumption in the domestic sector was broadly unchanged, up only 0.2 per cent with increased demand for heating likely offset by energy efficiency improvements. On a temperature adjusted basis domestic consumption is estimated to have fallen by 3.1 per cent, slightly above the average of 2.5 per cent per annum seen since 2004. There were small rises in consumption in industry, services and for non-energy use, up by 2.4, 3.1 and 3.9 per cent respectively, with a fall in transport consumption of 0.7 per cent. Final energy consumption in 2013 is accounted for by the transport sector (35.6 per cent), the domestic sector (29.2 per cent), the industrial sector (16.1 per cent), the services sector (14.0 per cent) and non-energy use (5.1 per cent). These figures are illustrated in Chart 1.5. Recent trends in industrial consumption are shown in Table 1.8 and are discussed in paragraphs 1.26 to 1.27. Final energy consumption on a temperature corrected basis is estimated to be down 0.6 per cent in 2013, continuing the downward trend of the last nine years.

1.17 The main fuels used by final consumers in 2013 were petroleum products (44.8 per cent), natural gas (32.3 per cent) and electricity (18.2 per cent). The amount of heat that was bought for final consumption accounted for 0.9 per cent of the total final energy consumption.

Chart 1.5: Final consumption 2013



Total: 150.1 million tonnes of oil equivalent

(1) Includes services and agricultural sectors.
(2) Includes coal, manufactured fuels, renewables & waste, and heat sold.

1.18 Of the petroleum products consumed by final users 10.4 per cent was for non-energy purposes; for natural gas 1.0 per cent was consumed for non-energy purposes. Non-energy use of fuels includes use as chemical feedstocks and other uses such as lubricants. Non-energy use of fuels for 2013 is shown in Table 1A. Further details of non-energy use are given in Chapter 2 paragraph 2.32, Chapter 3, paragraph 3.42 and Chapter 4, paragraph 4.24.

Table 1A: Non-energy use of fuels 2013

Thousand tonnes of oil equivalent

	Petroleum	Natural gas	Manufactured fuel
Petrochemical feedstocks	4,335	481	140
Other	2,652	-	-
Total	**6,988**	**481**	**140**

1.19 The data in the energy balances (Table 1.1) can be viewed in a number of ways, with a number of other statistics derived to produce different descriptions of the UK energy market. Recently greater focus has been given to looking at import dependency and also at fossil fuel dependency. Import dependency (Table 1B) is calculated by dividing net imports by primary supply, including an addition for the energy supplied to marine bunkers.

Table 1B: Net import dependency 2011 to 2013

Thousand tonnes of oil equivalent

	2011	2012	2013
Net imports	78,748	93,745	101,802
Primary energy supply + bunkers	214,599	217,375	216,220
Net import dependency	36.7%	43.1%	47.1%

1.20 The energy used in the UK can also be classified by whether its source was from fossil fuels, low-carbon sources or other (Table 1C). The main fossil fuel sources in the UK are coal, gas and oil. The low carbon sources include nuclear and renewables such as wind; hydro; and biofuels. In 2013, the share of energy from fossil fuels decreased to a record low of 86.2 per cent, whilst that from low-

carbon sources increased from having an 11.8 per cent to a 12.9 per cent share. The largest component of this series is currently nuclear; its share of energy supplied increased from 7.5 per cent to 7.7 per cent in 2013. There was a rise in the share from renewables; with the rise in wind output more than offsetting a slight reduction in use of hydro. The 'other' category, shown for completeness, includes net imports of electricity, as imports and exports could come from either of the previous categories, and non-biodegradable wastes. Headline data, taken from Table 6.7 later in this publication, show that renewables had a "normalised" 5.2 per cent share of final energy consumption in 2013 (the normalisation process takes out weather effects from this statistic; see paragraph 6.53). There are a range of measures of renewables contribution to energy and these are discussed in more detail in Chapter 6.

Table 1C: Fossil fuel and low carbon dependencies 2011 to 2013

Per cent

	2011	2012	2013
Fossil fuel	87.6%	87.4%	86.2%
Low-carbon	11.9%	11.8%	12.9%
Other	0.5%	0.8%	0.9%

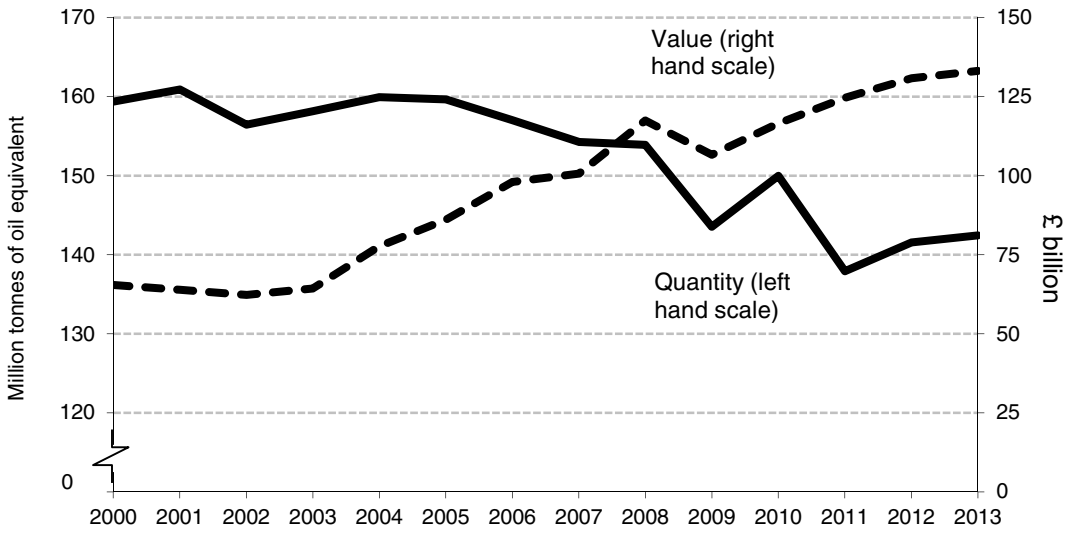
Value balance of traded energy (Tables 1.4, 1.5 and 1.6)

1.21 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 tables show how this value is generated from the final expenditure on energy (from the industrial and domestic sectors) through transformation processes and other energy sector users. The balances only contain values of energy which are traded, i.e. where a transparent market price is applicable. Further technical notes are given in paragraphs 1.39 to 1.45. 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 (CCL) and the Carbon Price Support (CPS) paid is included in Tables 1.4, 1.5 and 1.6. The CCL was introduced in April 2001 and is payable by non-domestic final consumers of gas, electricity, coal, coke and LPG, with the CPS, a tax on fossil fuel used to generate electricity, introduced in April 2013.

1.22 Total expenditure by final consumers in 2013 is estimated at £133,145 million, (£132,525 million shown as actual final consumption and £620 million of coal consumed by the iron and steel sector in producing coke for their own consumption). This is up by 2.2 per cent on 2012, with the most significant changes being the increased price of domestic gas and electricity in 2013. In 2013, crude oil prices averaged around $109 per barrel, down marginally compared to the levels in both 2011 and 2012, which were up sharply compared to an average price of $80 per barrel in 2010. Chart 1.6 shows energy consumption and expenditure by final users.

1.23 The value balance provides a guide on how the value chain works in the production and consumption of energy. For example, in 2013, £21,330 million of crude oil was indigenously produced, of which £17,850 million was exported; and £30,110 million of crude oil was imported. Allowing for stock changes, this provides a total value of UK inland crude oil supply of £33,960 million. This fuel was then completely consumed within the petroleum industry in the process of producing £38,990 million of petroleum products. Again some external trade and stock changes took place before arriving at a basic value of petroleum products of £39,470 million. In supplying the fuel to final consumers distribution costs were incurred and some profit was made amounting to £2,395 million, whilst duty and tax meant a further £33,560 million was added to the basic price to arrive at the final market value of £75,565 million. This was the value of petroleum products purchased, of which industry purchased £2,490 million, domestic consumers for heating purposes purchased £1,725 million, with the vast majority £71,050 million, purchased by the transport sector.

Chart 1.6: Energy consumption and estimated expenditure on energy by final users



1.24 Of the total final expenditure on energy in 2013 (£133 billion), the biggest share, 51 per cent, fell to the transport sector. Industry purchased 10 per cent (£14 billion), the domestic sector purchased 27 per cent (£36 billion), with the remaining 11 per cent (£15 billion) purchased by the service sector.

Sales of electricity and gas by sector (Table 1.7)

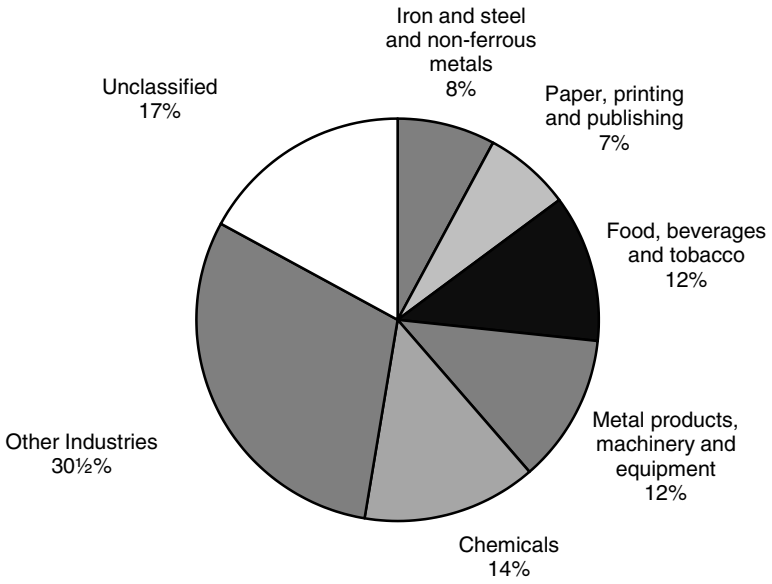
1.25 Table 1.7 shows broad estimates for the total value of electricity and gas to final consumption. Net selling values provide some indication of typical prices paid in broad sectors and can be of use to supplement more detailed and accurate information contained in the rest of this chapter. More detailed information on energy prices is available in *Quarterly Energy Prices*, available on DECC's energy statistics website at: www.gov.uk/government/collections/quarterly-energy-prices

Energy consumption by main industrial groups (Table 1.8)

1.26 This table presents final energy consumption for the main industrial sub-sectors over the last five years. So far as is practicable, the user categories have been regrouped on the basis of the 2007 Standard Industrial Classification (see paragraphs 1.56 to 1.60). 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).

1.27 In 2013, 24.2 million tonnes of oil equivalent were consumed by the main industrial groups. The largest consuming groups were chemicals (14 per cent), metal products, machinery and equipment (12 per cent), food, beverages and tobacco (12 per cent), iron and steel and non-ferrous metals (7.9 per cent), and paper, printing and publishing (7.0 per cent). The figures are illustrated in Chart 1.7. The large other industries sector includes mineral products (12 per cent) as well as a number of the smaller energy consuming sectors.

Chart 1.7: Energy consumption by main industrial groups 2013



Total final energy consumption by industry
24.2 million tonnes of oil equivalent

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

1.28 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 1.33 and 1.34. 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 1.34.

Technical notes and definitions

I Units and measurement of energy

Units of measurement

1.29 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)

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

1.30 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.gov.uk/government/publications/energy-chapter-1-digest-of-united-kingdom-energy-statistics-dukes) 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 1.54).

1.31 Estimated gross and net calorific values for 2013 are given in Table A.1 in Annex A. 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. 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 in Annex A.

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 in Annex A.

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 (39.3 per cent in 2013). (See Chapter 5, paragraphs 5.74 and 5.82).

Non-energy uses of fuel

1.32 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, paragraph 3.42.

Autogeneration of electricity

1.33 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 section 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.

1.34 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, and 5.1 to 5.5. 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 7 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 7 paragraphs 7.37 to 7.43. 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

1.35 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.

1.36 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

1.37 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 Ricardo-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.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes 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)

1.38 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

1.39 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 tables allow for more varied use and interpretation of traded energy value data. That said, the tables continue to only show values for energy that has to be purchased and therefore do not include estimated values of a sector's internal consumption, such as coal used in the process of coal extraction.

The value balance

1.40 The tables balances around **market value of inland consumption**, with the lower half of the tables 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 tables show 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.

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

Fuel definitions in value balances

1.42 **Crude oil** includes Natural Gas Liquids (NGLs) 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** include coke, breeze and other solid manufactured fuels, mainly products from patent fuel and carbonisation plants. **Other fuels** include 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

1.43 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 e.g. 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 e.g. 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 (diesel-engined road vehicle) use. **Commercial and other users** include public administration and miscellaneous uses not classified to the industrial sector.

Supply

1.44 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.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes). 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.6. **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)

1.45 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

1.46 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

1.47 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 1D presents shares of final consumption on this basis. The final consumption figures are presented on this basis throughout Chapter 1.

1.48 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 1E presents shares of final consumption on this basis.

Final consumption - useful energy basis

1.49 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

1.50 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 2013 are presented in Table 1D. For comparison, Table 1E presents shares of final consumption on a primary fuel input basis.

Table 1D: Primary and secondary fuels consumed by final users in 2013 – energy supplied basis

	Percentage of each fuel						Percentage of each sector					
	Industry	Transport	Domestic	Others	Total		Solid fuels	Petr-oleum	Gas	Electricity	Bio-energy	Total
Solid fuels	73	0	26	1	100	Industry	9	19	34	36	2	100
Petroleum	7	86	5	2	100	Transport	0	97	-	1	2	100
Gas	17	-	62	21	100	Domestic	2	6	68	22	2	100
Electricity	31	1	36	32	100	Others	0	6	50	42	2	100
Bioenergy	19	38	31	15	100							
All fuels	**17**	**38**	**31**	**15**	**100**	**All users**	**2**	**43**	**34**	**19**	**2**	**100**

Table 1E: Total primary fuel consumption by final users in 2013 - primary input basis

	Percentage of each fuel						Percentage of each sector					
	Industry	Transport	Domestic	Others	Total		Coal	Petr-oleum	Gas	Primary electricity	Bio-energy	Total
Coal	34	1	35	30	100	Industry	32	12	37	14	6	100
Petroleum	8	85	5	2	100	Transport	1	96	0	0	2	100
Gas	22	0	53	24	100	Domestic	21	5	59	11	5	100
Primary electricity	31	1	36	32	100	Others	29	4	45	16	6	100
Bioenergy	27	13	34	25	100							
All fuels	**21**	**28**	**32**	**19**	**100**	**All users**	**19**	**32**	**35**	**10**	**4**	**100**

1.51 In 2013, every 1 toe of secondary electricity consumed by final users required, on average, 1.1 toe of coal, 0.6 toe of natural gas, 0.6 toe of primary electricity (nuclear, wind, natural flow hydro and imports) and 0.3 toe of oil and bioenergy combined. The extent of this primary consumption is hidden in Table 1D, 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 1E, 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.

1.52 Another view comes from shares of users' expenditure on each fuel (Table 1F 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 1F: Value of fuels purchased by final users in 2013

Percentage of each sector

	Solid fuels	Petroleum	Gas	Secondary electricity	Heat	Biofuels	Total
Industry	9	18	18	52	3	1	100
Transport	-	96	-	1	-	3	100
Domestic	1	5	47	46	-	1	100
Others	-	6	19	73	1	-	100
All users	**1**	**53**	**17**	**26**	**0**	**2**	**100**

Systems of measurement - international statistics

1.53 The systems of energy measurement used in various international statistics differ slightly from the methods of the Digest. The key difference is the conversion factors used in DECC's headline data that change the units for fuels for a volume or weight measure to an energy basis, as discussed in the paragraph below. However, in line with the International Recommendations for Energy Statistics (IRES) the UK does make data available on both bases. Other differences are that both the International Energy Agency (IEA) as well as the United Nations' IRES have International Aviation Bunkers as well as International Marine Bunkers shown together and not included in the country's energy supply. The UK in its energy balances continues to show fuel used for international marine bunkers in this manner but has continued to show fuel for international aviation as part of final consumption - this practice is also followed by Eurostat.

Net calorific values

1.54 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 13.9 GJ at 25 per cent moisture content and 18.6 GJ for dry wood (equivalent to a net calorific value). Both gross and net calorific values are shown in Annex A. Energy balances on a net calorific basis are published in an annex to DUKES available via the internet.

V Definitions of fuels

1.55 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 (C_5 or heavier) and petroleum gases other than methane C_1, that is ethane C_2, propane C_3 and butane C_4, 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 C_1 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 5.66 to 5.73.

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 6.

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

1.56 The Digest has been prepared, as far as is practicable, on the basis of the *Standard Industrial Classification (SIC)2007* (www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/standard-industrial-classification/index.html). Table 1G shows the categories of consumers together with their codes in SIC 2007. SIC(2007) replaced SIC(2003) on 1 January 2008, with energy statistics being compiled on the new basis from 2010.

Table 1G: SIC 2007 classifications

Fuel producers	05-07, 09, 19, 24.46, 35
Final consumers:	
Industrial	
Unclassified	See paragraph 1.58
Iron and steel	24, (*excluding* 24.4, 24.53, 24.54)
Non-ferrous metals	24.4, (*excluding* 24.46), 24.53, 24.54
Mineral products	08, 23
Chemicals	20-21
Mechanical engineering and metal products	25, 28
Electrical and instrument engineering	26-27
Vehicles	29-30
Food, beverages & tobacco	10-12
Textiles, clothing, leather, & footwear	13-15
Paper, printing & publishing	17-18
Other industries	16, 22, 31-33, 36-39
Construction	41-43
Transport	49-51 (part*)
Other final users	
Domestic	Not covered by SIC 2007
Public administration	84-88
Commercial	45-47, 49-51 (part*), 52-53, 55-56, 58-66, 68-75, 77-82
Agriculture	01-03
Miscellaneous	90-99

* Note – transport sector includes only energy used for motion/traction purposes. Other energy used by transport companies is classified to the commercial sector.

SIC(2003) was introduced at the start of 2003; the previous classification SIC(1992) was used from 1995. Between 1986 and 1994 data in the Digest were prepared on the basis of SIC(1980). The changes in classification between SIC(1992), SIC(2003) and SIC(2007) 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.

1.57 The coverage varies between tables (e.g. 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.

1.58 There is also an 'unclassified' category in the industry sector (see Table 1G). 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.

1.59 In Tables 7.8 and 7.9 of Chapter 7 the following abbreviated grouping of industries, based on SIC 2007, is used in order to prevent disclosure of information about individual companies.

Table 1H: Abbreviated grouping of Industry

Iron and steel and non-ferrous metal	24
Chemicals	20-21
Oil refineries	19.2
Paper, printing and publishing	17-18
Food, beverages and tobacco	10-12
Metal products, machinery and equipment	25, 26, 27, 28, 29, 30
Mineral products, extraction, mining and agglomeration of solid fuels	05, 06, 08, 23
Sewage Treatment	(parts of 36 and 37)
Electricity supply	35.1
Other industrial branches	07, 13, 14, 15,16, 19.1, 24.46, 22, 31, 32, 33, 35.2, 36 & 37 (remainder) 41, 42, 43
Transport, commerce, and administration	1, 2, 3, 45 to 99 (except 93)
Other	35.3, 93

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

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

Iron and steel and non-ferrous metals	24
Chemicals	20-21
Paper, printing and publishing	17-18
Food, beverages and tobacco	10-12
Metal products, machinery and equipment	25-30
Other (including construction)	08, 13-16, 19, 22-23, 31-33, 36-39, 41-43

VII Monthly and quarterly data

1.61 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.gov.uk/government/publications/total-energy-section-1-energy-trends. 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

1.62 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. Typically, the supply of fuels is easier to measure than demand, and thus greater reliance can be made of these numbers.

IX Revisions

1.63 Table 1J below shows a summary of the revisions made to the major energy aggregates between this year's edition of DUKES and the immediately preceding version. This year, the revisions window for DUKES was again 2008, with changes to methodology and revised data allowed back to that date. Key methodological changes this year included a further reassessment of sea transport data that switched back some energy use from marine bunkers to national navigation. This reallocation has resulted in the increase of supply, demand and final consumption in the tables below – as fuel used by international marine bunkers are not included within these aggregates. More details of this are provided in chapter 3, paragraph 3.65. There was also a reallocation of gas use between the industrial and services sectors.

Table 1J: Revisions since DUKES 2013

Thousand tonnes of oil equivalent

	2007	2008	2009	2010	2011	2012	Percentage revisions to 2012 data
Indigenous production	-	37	-66	-8	-57	-126	-0.1%
Primary supply	-	642	629	1,434	811	623	0.3%
Primary demand	-	982	637	610	493	519	0.2%
Transformation	-	-23	-16	200	75	94	-0.2%
Energy industry use	-	-149	122	358	456	318	2.4%
Final consumption	-	1,605	945	963	512	666	0.4%
Industry	-	-1,079	-1,777	-741	-1,560	-1,490	-5.9%
Transport	-	593	552	597	518	521	1.0%
Other	-	2,661	2,355	1,571	1,626	1,916	3.1%
Non energy use	-	-569	-184	-464	-72	-281	-3.7%

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1.1 Aggregate energy balance 2013
Gross calorific values

Thousand tonnes of oil equivalent

	Coal	Manufactured fuel *(1)*	Primary oils	Petroleum products	Natural gas *(2)*	Bioenergy & waste *(3)*	Primary electricity	Electricity	Heat sold	Total
Supply										
Indigenous production	8,025	-	44,468	-	36,523	6,883	18,467	-	-	114,366
Imports	32,122	593	64,675	30,908	46,011	2,167	-	1,508	-	177,984
Exports	-447	-83	-37,009	-28,698	-9,429	-247	-	-267	-	-76,182
Marine bunkers	-	-	-	-2,691	-	-	-	-	-	-2,691
Stock change *(4)*	-789	-87	+791	+84	+53	-	-	-	-	+53
Primary supply	**38,911**	**423**	**72,926**	**-397**	**73,157**	**8,803**	**18,467**	**1,241**	**-**	**213,530**
Statistical difference *(5)*	-111	-4	-104	-131	-19	-	-	-15	-	-384
Primary demand	**39,022**	**426**	**73,030**	**-266**	**73,177**	**8,803**	**18,467**	**1,256**	**-**	**213,914**
Transfers	-	+5	-2,023	+2,026	-5	-	-3,024	+3,024	-	+3
Transformation	**-37,053**	**1,514**	**-71,007**	**70,181**	**-19,388**	**-5,934**	**-15,442**	**27,608**	**1,451**	**-48,071**
Electricity generation	-31,432	-939	-	-588	-17,397	-5,834	-15,442	27,608	-	-44,024
Major power producers	-31,308	-	-	-246	-14,751	-2,403	-15,442	25,225	-	-38,925
Autogenerators	-124	-939	-	-342	-2,646	-3,430	-	2,383	-	-5,098
Heat generation	-378	-51	-	-68	-1,991	-101	-	-	1,451	-1,138
Petroleum refineries	-	-	-71,007	70,932	-	-	-	-	-	-75
Coke manufacture	-4,020	3,574	-	-	-	-	-	-	-	-446
Blast furnaces	-1,073	-1,308	-	-	-	-	-	-	-	-2,381
Patent fuel manufacture	-150	239	-	-95	-	-	-	-	-	-6
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	**2**	**777**	**-**	**4,657**	**4,718**	**-**	**-**	**2,283**	**160**	**12,597**
Electricity generation	-	-	-	-	-	-	-	1,538	-	1,538
Oil and gas extraction	-	-	-	672	4,003	-	-	49	-	4,725
Petroleum refineries	-	-	-	3,984	99	-	-	361	160	4,604
Coal extraction	2	-	-	-	14	-	-	68	-	84
Coke manufacture	-	378	-	-	-	-	-	7	-	385
Blast furnaces	-	400	-	-	31	-	-	38	-	469
Patent fuel manufacture	-	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	89	-	89
Other	-	-	-	-	571	-	-	133	-	705
Losses	**-**	**215**	**-**	**-**	**643**	**-**	**-**	**2,322**	**-**	**3,179**
Final consumption	**1,967**	**953**	**-**	**67,285**	**48,423**	**2,868**	**-**	**27,283**	**1,292**	**150,069**
Industry	**1,441**	**592**	**-**	**4,351**	**8,023**	**550**	**-**	**8,427**	**847**	**24,231**
Unclassified	-	74	-	3,512	1	550	-	-	-	4,137
Iron and steel	38	518	-	4	459	-	-	327	-	1,346
Non-ferrous metals	14	-	-	0	165	-	-	381	-	560
Mineral products	776	-	-	163	1,305	-	-	578	-	2,822
Chemicals	55	-	-	103	1,330	-	-	1,486	419	3,392
Mechanical engineering etc	8	-	-	-	486	-	-	607	-	1,102
Electrical engineering etc	4	-	-	1	225	-	-	531	-	760
Vehicles	37	-	-	175	386	-	-	436	-	1,033
Food, beverages etc	31	-	-	134	1,750	-	-	951	0	2,866
Textiles, leather etc	42	-	-	43	443	-	-	249	-	778
Paper, printing etc	70	-	-	29	645	-	-	948	-	1,692
Other industries	362	-	-	31	449	-	-	1,808	427	3,078
Construction	5	-	-	156	377	-	-	126	-	664
Transport *(6)*	**10**	**-**	**-**	**51,964**	**-**	**1,091**	**-**	**353**	**-**	**53,418**
Air	-	-	-	12,258	-	-	-	-	-	12,258
Rail	10	-	-	700	-	-	-	350	-	1,060
Road	-	-	-	38,177	-	1,091	-	3	-	39,271
National navigation	-	-	-	828	-	-	-	-	-	828
Pipelines	-	-	-	-	-	-	-	-	-	-
Other	**516**	**221**	**-**	**3,982**	**39,918**	**1,227**	**-**	**18,502**	**445**	**64,811**
Domestic	492	221	-	2,769	29,622	884	-	9,755	52	43,794
Public administration	16	-	-	290	3,826	98	-	1,618	381	6,230
Commercial	4	-	-	386	5,184	33	-	6,796	11	12,414
Agriculture	-	-	-	294	94	211	-	333	-	932
Miscellaneous	5	-	-	243	1,193	0	-	-	-	1,441
Non energy use	-	**140**	-	**6,988**	**481**	-	-	-	-	**7,609**

(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 5.12 regarding electricity use in transport and 6.40 regarding renewables use in transport.

1.2 Aggregate energy balance 2012
Gross calorific values

Thousand tonnes of oil equivalent

	Coal	Manufactured fuel *(1)*	Primary oils	Petroleum products	Natural gas *(2)*	Bioenergy & waste *(3)*	Primary electricity	Electricity	Heat sold	Total
Supply										
Indigenous production	10,634	-	48,756	-	38,925r	6,235r	17,467r	-	-	122,016r
Imports	29,061	148r	66,181	28,493r	47,250r	1,725	-	1,182r	-	174,040r
Exports	-368	-393r	-37,151	-29,533	-12,384	-306	-	-161r	-	-80,295r
Marine bunkers	-	-	-	-2,812r	-	-	-	-	-	-2,812r
Stock change *(4)*	+1,956r	+67r	-532	+146	-23r	-	-	-	-	+1,613r
Primary supply	**41,284r**	**-179r**	**77,254**	**-3,705r**	**73,768r**	**7,654r**	**17,467r**	**1,021r**	**-**	**214,563r**
Statistical difference *(5)*	+284r	-8r	-180	-82r	-202r	-	-	-79r	-	-268r
Primary demand	**41,000r**	**-171r**	**77,434**	**-3,623r**	**73,971r**	**7,654r**	**17,467r**	**1,100r**	**-**	**214,831r**
Transfers	-	+5	-2,286	+2,231r	-5		-2,261r	+2,261r	-	-55r
Transformation	**-39,250r**	**1,698r**	**-75,148**	**74,205r**	**-20,613r**	**-5,230r**	**-15,205**	**28,731r**	**1,533r**	**-49,278r**
Electricity generation	-34,316r	-800r	-	-716r	-18,456r	-5,105r	-15,205	28,731r	-	-45,868r
Major power producers	-33,655	-	-	-397r	-15,684	-1,766	-15,205	26,147	-	-40,561r
Autogenerators	-661r	-800r	-	-319r	-2,771r	-3,339r	-	2,584r	-	-5,307r
Heat generation	-286r	-51	-	-81r	-2,157r	-125r	-		1,533r	-1,168r
Petroleum refineries	-	-	-75,148	75,074r	-	-	-	-	-	-74r
Coke manufacture	-3,775r	3,506r	-	-	-	-	-	-	-	-268r
Blast furnaces	-750	-1,140r	-	-	-	-	-	-	-	-1,890r
Patent fuel manufacture	-123r	183r	-	-71r	-	-	-	-	-	-11r
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	**3**	**699r**	**-**	**5,166r**	**4,930r**	**-**	**-**	**2,278r**	**307r**	**13,383r**
Electricity generation	-	-	-	-	-	-	-	1,543r	-	1,543r
Oil and gas extraction	-	-	-	670r	4,167r	-	-	49	-	4,885r
Petroleum refineries	-	-	-	4,496r	139r	-	-	354r	307r	5,297r
Coal extraction	3	-	-	-	17	-	-	71	-	90r
Coke manufacture	-	386r	-	-	-	-	-	7	-	392r
Blast furnaces	-	314r	-	-	23	-	-	32	-	368r
Patent fuel manufacture	-	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	87	-	87
Other	-	-	-	-	584r	-	-	136r	-	720r
Losses	**-**	**87r**	**-**	**-**	**678r**	**-**	**-**	**2,486r**	**-**	**3,251r**
Final consumption	**1,747r**	**746r**	**-**	**67,648r**	**47,744r**	**2,424r**	**-**	**27,329r**	**1,226r**	**148,864r**
Industry	**1,212r**	**428r**	**-**	**4,529r**	**7,870r**	**458r**	**-**	**8,410r**	**766r**	**23,674r**
Unclassified	-	49r	-	3,693r	2	458r	-	-	-	4,202r
Iron and steel	36	379r	-	5	438r	-	-	290r	-	1,148r
Non-ferrous metals	13	-	-	-	163r	-	-	432r	-	608r
Mineral products	743r	-	-	167r	1,298r	-	-	580r	-	2,788r
Chemicals	49r	-	-	122r	1,308r	-	-	1,468r	336r	3,282r
Mechanical engineering etc	8	-	-	0r	502r	-	-	608r	-	1,118r
Electrical engineering etc	3	-	-	2	226r	-	-	532r	-	764r
Vehicles	35	-	-	146r	344r	-	-	437r	-	962r
Food, beverages etc	31r	-	-	126r	1,734r	-	-	957r	3r	2,850r
Textiles, leather etc	43	-	-	46r	450r	-	-	250r	-	789r
Paper, printing etc	80r	-	-	28r	609r	-	-	934r	1r	1,652r
Other industries	166r	-	-	40r	436r	-	-	1,794r	426r	2,862r
Construction	5	-	-	155r	362r	-	-	128r	-	650r
Transport *(6)*	**12**	**-**	**-**	**52,447r**	**-**	**958**	**-**	**352r**	**-**	**53,769r**
Air	**-**	**-**	-	12,408	**-**	**-**	**-**	**-**	**-**	12,408
Rail	12	**-**	-	698r	**-**	**-**	**-**	350r	**-**	1,060r
Road	**-**	**-**	-	38,508	**-**	958	**-**	2r	**-**	39,468r
National navigation	**-**	**-**	-	833r	**-**	**-**	**-**	**-**	**-**	833r
Pipelines	**-**	**-**	-	-	**-**	**-**	**-**	**-**	**-**	-
Other	**523r**	**185r**	**-**	**3,975r**	**39,379r**	**1,008r**	**-**	**18,566r**	**460r**	**64,096r**
Domestic	506r	185r	-	2,705r	29,672r	732r	**-**	9,868r	52	43,720r
Public administration	8r	-	-	318r	3,718r	89r	**-**	1,626r	402r	6,161r
Commercial	4	-	-	390	4,934r	30r	**-**	6,739r	6r	12,102r
Agriculture	1	-	-	306	100r	157r	**-**	333	-	897r
Miscellaneous	4r	-	-	255r	955r	0	**-**	-	-	1,216r
Non energy use	-	**133r**	**-**	**6,695r**	**496r**	-	-	-	-	**7,324r**

(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 5.12 regarding electricity use in transport and 6.40 regarding renewables use in transport.

1.3 Aggregate energy balance 2011
Gross calorific values

Thousand tonnes of oil equivalent

	Coal	Manufactured fuel *(1)*	Primary oils	Petroleum products	Natural gas *(2)*	Bioenergy & waste *(3)*	Primary electricity	Electricity	Heat sold	Total
Supply										
Indigenous production	11,580	-	56,902	-	45,289r	5,534r	17,465r	-	-	136,770r
Imports	21,399	33r	63,471	24,769	50,600r	1,854	-	747	-	162,873r
Exports	-370	-355r	-36,910	-30,299	-15,794	-184	-	-212	-	-84,124r
Marine bunkers	-	-	-	-3,287r	-	-	-	-	-	-3,287r
Stock change *(4)*	+534r	-385r	+667	+210	-1,945	-	-	-	-	-919r
Primary supply	**33,144r**	**-706r**	**84,130**	**-8,608r**	**78,149r**	**7,204r**	**17,465r**	**535**	**-**	**211,313r**
Statistical difference *(5)*	+44r	-14r	-351	-23r	-74r	-	-	-73r	-	-491r
Primary demand	**33,100r**	**-692r**	**84,481**	**-8,585r**	**78,223r**	**7,204r**	**17,465r**	**608r**	**-**	**211,803r**
Transfers	-	+5	-2,518	+2,496	-5	-	-1,840r	+1,840r	-	-22
Transformation	**-31,325r**	**2,285r**	**-81,963**	**80,791r**	**-28,381**	**-4,722r**	**-15,625**	**29,488r**	**1,388**	**-48,064r**
Electricity generation	-26,015	-678	-	-782r	-26,409	-4,625r	-15,625	29,488r	-	-44,647r
Major power producers	-25,221	-	-	-347r	-23,697	-1,263	-15,625	26,839	-	-39,314r
Autogenerators	-794	-678	-	-435r	-2,713	-3,362r	-	2,649r	-	-5,333r
Heat generation	-348	-51	-	-75	-1,972	-97	-	-	1,388	-1,155
Petroleum refineries	-	-	-81,963	81,726	-	-	-	-	-	-237
Coke manufacture	-4,032r	3,787r	-	-	-	-	-	-	-	-245r
Blast furnaces	-759	-980	-	0	-	-	-	-	-	-1,739
Patent fuel manufacture	-171	206r	-	-77r	-	-	-	-	-	-42r
Other	-	-	-	-	-	-	-	-	-	-
Energy industry use	**3**	**660**	**-**	**5,418r**	**5,555r**	**-**	**-**	**2,184r**	**182**	**14,001r**
Electricity generation	-	-	-	-	-	-	-	1,411r	-	1,411r
Oil and gas extraction	-	-	-	578	4,571	-	-	50	-	5,198
Petroleum refineries	-	-	-	4,840r	151r	-	-	403	182	5,576r
Coal extraction	3	-	-	-	19r	-	-	73	-	95r
Coke manufacture	-	386	-	-	-	-	-	7	-	393
Blast furnaces	-	274	-	-	39	-	-	22	-	334
Patent fuel manufacture	-	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	81	-	81r
Other	-	-	-	-	775r	-	-	138	-	913r
Losses	**-**	**151**	**-**	**-**	**854r**	**-**	**-**	**2,419r**	**-**	**3,423r**
Final consumption	**1,772r**	**788r**	**-**	**69,285r**	**43,427r**	**2,482r**	**-**	**27,333r**	**1,206**	**146,293r**
Industry	**1,194r**	**447r**	**-**	**4,500r**	**8,127r**	**505r**	**-**	**8,801r**	**769**	**24,344r**
Unclassified	-	42r	-	3,605r	2	505r	-	-	-	4,154r
Iron and steel	38	405r	-	4	501r	-	-	331r	-	1,279r
Non-ferrous metals	14	-	-	0r	158r	-	-	599	-	771r
Mineral products	697	-	-	178r	1,384r	-	-	603	-	2,861r
Chemicals	50	-	-	189r	1,379r	-	-	1,517	350	3,484r
Mechanical engineering etc	8	-	-	1	487r	-	-	624	-	1,119r
Electrical engineering etc	3	-	-	0	217r	-	-	549	-	770r
Vehicles	37	-	-	137r	323r	-	-	446	-	944r
Food, beverages etc	32	-	-	141r	1,764r	-	-	973	2	2,912r
Textiles, leather etc	45	-	-	49r	460r	-	-	257	-	811r
Paper, printing etc	71	-	-	30r	641r	-	-	938	1	1,681r
Other industries	193r	-	-	9r	443r	-	-	1,832r	417	2,894r
Construction	6	-	-	156r	367r	-	-	132	-	662r
Transport *(6)*	**11**	**-**	**-**	**53,034r**	**-**	**1,128**	**-**	**351**	**-**	**54,524r**
Air	**-**	**-**	**-**	12,802	**-**	**-**	**-**	**-**	**-**	12,802
Rail	11	**-**	**-**	692	**-**	**-**	**-**	349	**-**	1,052r
Road	**-**	**-**	**-**	38,646	**-**	1,128	**-**	2	**-**	39,775
National navigation	**-**	**-**	**-**	894r	**-**	**-**	**-**	**-**	**-**	894r
Pipelines	**-**	**-**	**-**	-	**-**	**-**	**-**	**-**	**-**	-
Other	**567r**	**198r**	**-**	**4,029r**	**34,789r**	**849r**	**-**	**18,181r**	**437**	**59,050r**
Domestic	540r	198r	-	2,669r	25,228	580r	-	9,596r	52	38,862r
Public administration	18r	-	-	366r	3,694r	94r	-	1,582	382	6,135r
Commercial	4	-	-	433	4,794r	19r	-	6,663r	3	11,916r
Agriculture	1	-	-	303	116r	156r	-	339	-	916r
Miscellaneous	5	-	-	259	957r	0	-	-	-	1,221r
Non energy use	-	**142r**	-	**7,722r**	**512**	-	-	-	-	**8,376r**

(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 5.12 regarding electricity use in transport and 6.40 regarding renewables use in transport.

1.4 Value balance of traded energy in 2013[(1)]

£million

	Coal	Manufactured fuels	Crude oil	Petroleum products	Natural gas	Electricity	Heat sold	Other fuels	Total
Supply									
Indigenous production	575	290	21,330	38,990	7,150	16,690	590	2,010	87,630
Imports	3,165	185	30,100	17,055	10,985	935	-	415	62,840
Exports	-75	-30	-17,850	-15,130	-2,510	-170	-	-	-35,760
Marine bunkers	-	-	-	-1,400	-	-	-	-	-1,400
Stock change	-25	-75	380	-45	15	-	-	-	250
Basic value of inland consumption	**3,645**	**370**	**33,960**	**39,470**	**15,640**	**17,455**	**590**	**2,425**	**113,565**
Tax and margins									
Distribution costs and margins	**615**	**30**	**-**	**2,395**	**12,400**	**17,310**	**-**	**110**	**32,855**
Electricity generation	245	-	-	5	-	-	-	-	250
Solid fuel manufacture	165	-	-	-	-	-	-	-	165
of which iron & steel sector	140	-		-	-	-	-	-	140
Iron & steel final use	40	5		-	-	-	-	-	50
Other industry	70	5	-	345	-	-	-	-	420
Air transport	-	-	-	185	-	-	-	-	185
Rail and national navigation	-	-	-	45	-	-	-	-	45
Road transport	-	-	-	1,155	-	-	-	110	1,260
Domestic	95	15	-	120	-	-	-	-	230
Agriculture	-	-	-	25	-	-	-	-	25
Commercial and other services	5	-	-	80	-	-	-	-	85
Non energy use	-	-	-	435	145	-	-	-	580
VAT and duties	**10**	**5**	**-**	**33,560**	**795**	**790**	**-**	**1,300**	**36,460**
Electricity generation	-	-	-	35	-	-	-	-	35
Iron & steel final use	-	-	-	-	-	-	-	-	-
Other industry	-	-	-	215	-	-	-	-	215
Air transport	-	-	-	10	-	-	-	-	10
Rail and national navigation	-	-	-	180	-	-	-	-	180
Road transport	-	-	-	32,895	-	-	-	1,280	34,175
Domestic	10	5	-	100	795	790	-	15	1,715
Agriculture	-	-	-	20	-	-	-	-	20
Commercial and other services	-	-	-	110	-	-	-	-	110
Climate Change Levy/Carbon Price Support	**235**	**-**		135	**325**	**370**			**1,065**
Total tax and margins	**860**	**35**	**-**	**36,090**	**13,520**	**18,470**	**-**	**1,410**	**70,380**
Market value of inland consumption	**4,505**	**405**	**33,960**	**75,565**	**29,160**	**35,925**	**590**	**3,835**	**183,945**
Energy end use									
Total energy sector	**3,835**	**-**	**33,960**	**1,475**	**6,425**	**1,285**	**65**	**1,130**	**48,175**
Transformation	3,835	-	33,960	270	5,175	955	-	1,130	45,320
Electricity generation	3,080	-	-	235	4,640	955	-	1,130	10,040
of which from stocks	30	-	-	-	-	-	-	-	30
Heat Generation	35	-	-	35	530	-	-	-	605
Petroleum refineries	-	-	33,960	-	-	-	-	-	33,960
Solid fuel manufacture	715	-	-	-	-	-	-	-	715
of which iron & steel sector	620	-	-	-	-	-	-	-	620
Other energy sector use	**-**	**-**	**-**	**1,205**	**1,250**	**335**	**65**	**-**	**2,855**
Oil & gas extraction	-	-	-	375	1,070	45	-	-	1,495
Petroleum refineries	-	-	-	830	25	215	65	-	1,135
Coal extraction	-	-	-	-	-	65	-	-	65
Other energy sector	-	-	-	-	155	5	-	-	160
Total non energy sector use	**675**	**345**	**-**	**71,050**	**22,590**	**34,635**	**525**	**2,705**	**132,525**
Industry	**425**	**220**	**-**	**2,490**	**2,450**	**7,140**	**345**	**85**	**13,160**
Iron & steel final use	190	190	-	-	145	255	-	20	805
Other industry	235	30	-	2,485	2,305	6,885	345	65	12,355
Transport	**5**	**-**	**-**	**65,965**	**-**	**375**	**-**	**2,175**	**68,520**
Air	-	-	-	7,105	-	-	-	-	7,105
Rail and national navigation	5	-	-	1,050	-	375	-	-	1,425
Road	-	-	-	57,810	-	5	-	2,175	59,990
Other final users	**245**	**125**	**-**	**2,595**	**20,140**	**27,125**	**180**	**440**	**50,845**
Domestic	235	125	-	1,725	16,670	16,575	20	405	35,760
Agriculture	-	-	-	190	40	435	-	20	685
Commercial and other services	5	-	-	685	3,435	10,110	155	10	14,400
Total value of energy end use	**4,505**	**345**	**33,960**	**72,525**	**29,015**	**35,925**	**590**	**3,835**	**180,700**
Value of non energy end use	**-**	**55**	**-**	**3,040**	**145**	**-**	**-**	**-**	**3,245**
Market value of inland consumption	**4,505**	**405**	**33,960**	**75,565**	**29,160**	**35,925**	**590**	**3,835**	**183,945**

(1) For further information see paragraphs 1.39 to 1.45.

1.5 Value balance of traded energy in 2012(1)

£million

	Coal	Manufactured fuels	Crude oil	Petroleum products	Natural gas	Electricity	Heat sold	Other fuels	Total
Supply									
Indigenous production	970	420r	23,685r	42,515r	7,375r	16,200r	625r	1,735r	93,520r
Imports	3,335r	50r	31,315	16,430r	10,035r	675	-	515	62,350r
Exports	-55r	-125	-18,035r	-16,775r	-2,885r	-100	-	-	-37,985r
Marine bunkers	-	-	-	-1,485r	-	-	-	-	-1,485r
Stock change	195r	-55	-255	65	-5	-	-	-	-60
Basic value of inland consumption	**4,440r**	**290r**	**36,705r**	**40,750r**	**14,515r**	**16,770r**	**625r**	**2,250r**	**116,345r**
Tax and margins									
Distribution costs and margins	**785r**	**20**	**-**	**2,320r**	**11,940r**	**16,065r**	**-**	**95**	**31,230r**
Electricity generation	415	-	-	10r	-	-	-	-	425r
Solid fuel manufacture	195r	-	-	-	-	-	-	-	195r
of which iron & steel sector	175	-	-	-	-	-	-	-	175
Iron & steel final use	35	5	-	-	-	-	-	-	45r
Other industry	45r	5	-	280r	-	-	-	-	330r
Air transport	-	-	-	195r	-	-	-	-	195r
Rail and national navigation	-	-	-	45r	-	-	-	-	45r
Road transport	-	-	-	1,170r	-	-	-	95	1,270r
Domestic	90r	10r	-	145r	-	-	-	-	245r
Agriculture	-	-	-	25	-	-	-	-	25
Commercial and other services	5	-	-	80	-	-	-	-	85
Non energy use	-	-	-	365r	135r	-	-	-	500
VAT and duties	**10**	**5**	**-**	**33,915r**	**750r**	**745r**	**-**	**1,160**	**36,590r**
Electricity generation	-	-	-	45	-	-	-	-	45
Iron & steel final use	-	-	-	-	-	-	-	-	-
Other industry	-	-	-	255r	-	-	-	-	255r
Air transport	-	-	-	10	-	-	-	-	10
Rail and national navigation	-	-	-	180r	-	-	-	-	180r
Road transport	-	-	-	33,190r	-	-	-	1,140	34,330r
Domestic	10	5	-	100	750r	745r	-	20r	1,630r
Agriculture	-	-	-	20	-	-	-	-	20
Commercial and other services	-	-	-	115	-	-	-	-	115
Climate Change Levy	**5**	**-**	**-**		**190**	**445**	**-**	**-**	**640**
Total tax and margins	**800r**	**25**	**-**	**36,240r**	**12,875r**	**17,260**	**-**	**1,255**	**68,460r**
Market value of inland consumption	**5,240r**	**320r**	**36,705r**	**76,985r**	**27,395r**	**34,030r**	**625r**	**3,505r**	**184,805r**
Energy end use									
Total energy sector	**4,635r**	**-**	**36,705r**	**1,650r**	**6,325r**	**1,220r**	**125r**	**1,025r**	**51,690r**
Transformation	4,635r	-	36,705r	325r	5,110r	885	-	1,025r	48,685r
Electricity generation	3,750r	-	-	280r	4,575r	885	-	1,025r	10,515r
of which from stocks	55r	-	-	-	-	-	-	-	55r
Heat Generation	30r	-	-	40r	535r	-	-	-	610r
Petroleum refineries	-	-	36,705r	-	-	-	-	-	36,705r
Solid fuel manufacture	855r	-	-	-	-	-	-	-	855r
of which iron & steel sector	765	-	-	-	-	-	-	-	765
Other energy sector use	**-**	**-**	**-**	**1,330r**	**1,215r**	**335**	**125r**	**-**	**3,010r**
Oil & gas extraction	-	-	-	385r	1,035	45	-	-	1,465r
Petroleum refineries	-	-	-	940r	35r	220r	125r	-	1,320r
Coal extraction	-	-	-	-	-	65	-	-	70r
Other energy sector	-	-	-	-	145r	5r	-	-	150r
Total non energy sector use	**605r**	**265r**	**-**	**72,480r**	**20,930r**	**32,810r**	**500r**	**2,480r**	**130,070r**
Industry	**360r**	**160r**	**-**	**2,625r**	**2,180r**	**6,755**	**315r**	**80r**	**12,470r**
Iron & steel final use	175r	145r	-	5	125r	210	-	20r	675r
Other industry	185r	20r	-	2,620r	2,055r	6,545	315r	60r	11,800r
Transport	**5r**	**-**	**-**	**67,200r**	**-**	**345r**	**-**	**1,950**	**69,495r**
Air	-	-	-	7,430r	-	-	-	-	7,430r
Rail and national navigation	5r	-	-	1,075r	-	340r	-	-	1,420r
Road	-	-	-	58,695r	-	-	-	1,950	60,645r
Other final users	**240r**	**105r**	**-**	**2,660r**	**18,750r**	**25,710r**	**185r**	**455r**	**48,105r**
Domestic	235r	105r	-	1,740	15,720r	15,690r	20	410r	33,920r
Agriculture	-	-	-	195	40r	415r	-	35r	685r
Commercial and other services	5	-	-	720	2,995r	9,610r	165r	10r	13,500r
Total value of energy end use	**5,240r**	**265r**	**36,705r**	**74,135r**	**27,255r**	**34,030r**	**625r**	**3,505r**	**181,760r**
Value of non energy end use	**-**	**55r**	**-**	**2,855r**	**135r**	**-**	**-**	**-**	**3,045r**
Market value of inland consumption	**5,240r**	**320r**	**36,705r**	**76,985r**	**27,395r**	**34,030r**	**625r**	**3,505r**	**184,805r**

(1) For further information see paragraphs 1.39 to 1.45.

1.6 Value balance of traded energy in 2011 (1)

£million

	Coal	Manufactured fuels	Crude oil	Petroleum products	Natural gas	Electricity	Heat sold	Other fuels	Total
Supply									
Indigenous production	1,175r	370r	26,525r	42,445r	7,890r	14,885r	570	1,415r	95,280r
Imports	3,050	10	30,115	13,535r	9,630	465	-	655	57,460r
Exports	-60r	-100	-16,830r	-15,785r	-3,555	-140	-	-	-36,465r
Marine bunkers	-	-	-	-1,590r	-	-	-	-	-1,590r
Stock change	55	-10	320	95	-385	-	-	-	75
Basic value of inland consumption	**4,220r**	**275r**	**40,135r**	**38,700r**	**13,580r**	**15,215r**	**570**	**2,070r**	**114,760r**
Tax and margins									
Distribution costs and margins	**930r**	**25r**	**-**	**2,720r**	**10,470r**	**15,550**	**-**	**110**	**29,800r**
Electricity generation	505	-	-	10r	-	-	-	-	515r
Solid fuel manufacture	260r	-	-	-	-	-	-	-	260r
of which iron & steel sector	230	-	-	-	-	-	-	-	230
Iron & steel final use	45	10r	-	-	-	-	-	-	55r
Other industry	30	5	-	365r	-	-	-	-	395r
Air transport	-	-	-	265	-	-	-	-	265
Rail and national navigation	-	-	-	55r	-	-	-	-	55r
Road transport	-	-	-	1,320r	-	-	-	110	1,430r
Domestic	85r	10r	-	190r	-	-	-	-	290r
Agriculture	-	-	-	25r	-	-	-	-	25r
Commercial and other services	5	-	-	85	-	-	-	-	90
Non energy use	-	-	-	410r	130	-	-	-	540r
VAT and duties	**10**	**5**	**-**	**34,060r**	**585**	**695r**	**-**	**1,290r**	**36,650r**
Electricity generation	-	-	-	45	-	-	-	-	45
Iron & steel final use	-	-	-	-	-	-	-	-	-
Other industry	-	-	-	245r	-	-	-	-	245r
Air transport	-	-	-	10	-	-	-	-	10
Rail and national navigation	-	-	-	190r	-	-	-	-	190r
Road transport	-	-	-	33,325r	-	-	-	1,275	34,600r
Domestic	10	5	-	100	585	695r	-	15	1,410
Agriculture	-	-	-	20	-	-	-	-	20
Commercial and other services	-	-	-	125	-	-	-	-	125
Climate Change Levy	**5**	**-**	**-**		**175**	**500**	**-**	**-**	**680**
Total tax and margins	**945r**	**30r**	**-**	**36,780r**	**11,230r**	**16,745r**	**-**	**1,400**	**67,125r**
Market value of inland consumption	**5,170r**	**300r**	**40,135r**	**75,480r**	**24,810r**	**31,960r**	**570**	**3,465r**	**181,890r**
Energy end use									
Total energy sector	**4,530r**	**-**	**40,135r**	**625r**	**7,535r**	**1,100r**	**75**	**860r**	**54,860r**
Transformation	4,530r	-	40,135r	310r	6,310r	785	-	860r	52,930r
Electricity generation	3,355r	-	-	275r	5,870r	785	-	860r	11,145r
of which from stocks	110	-	-	-	-	-	-	-	110
Heat Generation	45	-	-	35	440	-	-	-	520
Petroleum refineries	-	-	40,135r	-	-	-	-	-	40,135r
Solid fuel manufacture	1,130r	-	-	-	-	-	-	-	1,130r
of which iron & steel sector	1,010	-	-	-	-	-	-	-	1,010
Other energy sector use	**-**	**-**	**-**	**315**	**1,225r**	**315**	**75**	**-**	**1,930r**
Oil & gas extraction	-	-	-	315	1,020	45	-	-	1,375
Petroleum refineries	-	-	-	-	35r	210	75	-	320r
Coal extraction	-	-	-	-	-	65	-	-	65
Other energy sector	-	-	-	-	170r	-	-	-	170r
Total non energy sector use	**640**	**250r**	**-**	**71,675r**	**17,150r**	**30,855r**	**495**	**2,605r**	**123,665r**
Industry	**385r**	**145r**	**-**	**2,575r**	**2,060r**	**6,545**	**315**	**95r**	**12,120r**
Iron & steel final use	205	130r	-	-	130r	230	-	30r	725r
Other industry	180r	15r	-	2,570r	1,930r	6,315	315	65r	11,395r
Transport	**5r**	**-**	**-**	**66,475r**	**-**	**300**	**-**	**2,150**	**68,935r**
Air	-	-	-	7,595	-	-	-	-	7,595
Rail and national navigation	5r	-	-	1,065r	-	300	-	-	1,370r
Road	-	-	-	57,815r	-	-	-	2,150	59,970r
Other final users	**250r**	**105r**	**-**	**2,625r**	**15,085r**	**24,010r**	**180**	**360r**	**42,610r**
Domestic	240r	105r	-	1,690	12,325	14,555r	20	305r	29,240r
Agriculture	-	-	-	190r	40r	405	-	35	670r
Commercial and other services	5	-	-	745	2,720r	9,055r	155	15r	12,700r
Total value of energy end use	**5,170r**	**250r**	**40,135r**	**72,300r**	**24,680r**	**31,960r**	**570**	**3,465r**	**178,525r**
Value of non energy end use	**-**	**55r**	**-**	**3,180r**	**130**	**-**	**-**	**-**	**3,365r**
Market value of inland consumption	**5,170r**	**300r**	**40,135r**	**75,480r**	**24,810r**	**31,960r**	**570**	**3,465r**	**181,890r**

(1) For further information see paragraphs 1.39 to 1.45.

1.7 Sales of electricity and gas by sector

United Kingdom

	2009	2010	2011	2012	2013
Total selling value (£ million)[1]					
Electricity generation - Gas	5,033r	5,449	5,275r	3,895r	3,944
Industrial - Gas	1,791r	1,771r	2,053r	2,173r	2,441
- Electricity	7,154r	6,656	6,879	7,092	7,472
of which:					
Fuel industries	380r	322	335	337	333
Industrial sector	6,774	6,334	6,545	6,755	7,139
Domestic sector - Gas	12,440r	13,595	11,738	14,970r	15,875
- Electricity	13,843	13,477r	13,860r	14,942r	15,786
Other - Gas	2,946r	2,796r	2,878r	3,161r	3,621
- Electricity	10,018	9,750	9,758r	10,367r	10,923
of which:					
Agricultural sector	396	407	403	416r	437
Commercial sector	7,777	7,776	7,748r	8,180r	8,640
Transport sector	335	280	302	344r	376
Public lighting	173	147	151	164	170
Public admin. and other services	1,337	1,139	1,155	1,264r	1,300
Total, all consumers	**53,226r**	**53,493r**	**52,441r**	**56,601r**	**60,063**
of which gas	**22,211r**	**23,610r**	**21,943r**	**24,200r**	**25,882**
of which electricity	**31,015r**	**29,883r**	**30,498r**	**32,401r**	**34,182**
Average net selling value per kWh sold (pence)[1]					
Electricity generation - Gas	1.403	1.461	1.914	2.135r	2.299
Industrial - Gas	1.963	1.790	2.172	2.375	2.616
- Electricity	7.530r	6.726	7.142	7.585	7.992
of which:					
Fuel industries	8.360r	7.106	7.390	8.048	8.217
Industrial sector	7.488	6.707	7.130	7.563	7.981
Domestic sector - Gas	3.611	3.490	4.001	4.338	4.608
- Electricity	11.678	11.343r	12.433r	13.089r	14.009
Other - Gas	2.741r	2.412	2.588	2.800	3.024
- Electricity	9.995	9.545	9.711r	10.289r	10.859
of which:					
Agricultural sector	10.410	10.110	10.202r	10.740r	11.284
Commercial sector	10.410	10.110	10.202r	10.740r	11.284
Transport sector	8.290	6.880	7.390	8.385r	9.142
Public lighting	8.540	7.510	7.910	8.590r	9.166
Public admin. and other services	8.540	7.510	7.910	8.590r	9.166
Average, all consumers	**4.378r**	**4.123r**	**4.842r**	**5.441r**	**5.798**
of which gas	**2.462r**	**2.416r**	**2.833r**	**3.307r**	**3.550**
of which electricity	**9.884r**	**9.341r**	**9.893r**	**10.506r**	**11.142**

(1) Excludes VAT where payable - see paragraph 1.45 for a definition of average net selling value.

1.8 Final energy consumption by main industrial groups[(1)]

Thousand tonnes of oil equivalent

	2009	2010	2011	2012	2013
Iron and steel and non-ferrous metals					
Coal	60	61r	51	49	52
Manufactured solid fuels *(2)*	332	301	281	310r	446
Blast furnace gas	29	87	64	26r	10
Coke oven gas	49	97	59r	43r	62
Natural gas	600r	686r	659r	600r	624
Petroleum	9r	6r	4r	5	4
Electricity	833	909	931r	723r	708
Total iron and steel and non-ferrous metals	**1,912r**	**2,147r**	**2,050r**	**1,756r**	**1,906**
Chemicals					
Coal	49	51	50	49r	55
Natural gas	1,501r	1,502r	1,379r	1,308r	1,330
Petroleum	216	312	189r	122r	103
Electricity	1,522	1,587	1,517	1,468r	1,486
Heat purchased from other sectors *(3)*	347	415	350	336r	419
Total chemicals	**3,635r**	**3,866r**	**3,484r**	**3,282r**	**3,392**
Metal products, machinery and equipment					
Coal	45	48	48	46	49
Natural gas	854r	1,008r	1,028r	1,073r	1,097
Petroleum	107r	125r	138r	148r	176
Electricity	1,647	1,685	1,619	1,577r	1,574
Heat purchased from other sectors *(3)*	-	-	-	-	-
Total metal products, machinery and equipment	**2,653r**	**2,866r**	**2,833r**	**2,843r**	**2,895**
Food, beverages and tobacco					
Coal	33	30r	32	31r	31
Natural gas	1,547r	1,714r	1,764r	1,734r	1,750
Petroleum	200r	157r	141r	126r	134
Electricity	924	991	973	957r	951
Heat purchased from other sectors *(3)*	1	1	2	3r	0
Total food, beverages and tobacco	**2,705r**	**2,893r**	**2,912r**	**2,850r**	**2,866**

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

	2009	2010	2011	2012	2013
Paper, printing and publishing					
Coal	71	71	71	80r	70
Natural gas	660r	700r	641r	609r	645
Petroleum	34r	33r	30r	28r	29
Electricity	952	942	938	934r	948
Heat purchased from other sectors *(3)*	-	1	1	1r	-
Total paper, printing and publishing	**1,716r**	**1,747r**	**1,681r**	**1,652r**	**1,692**
Other industries					
Coal	893	1,062r	942r	957r	1,185
Natural gas	2,683r	2,894r	2,654r	2,545r	2,575
Petroleum	399r	459r	392r	408r	393
Electricity	2,698	2,875r	2,824r	2,753r	2,762
Heat purchased from other sectors *(3)*	415	405	417	426r	427
Total other industries	**7,089r**	**7,694r**	**7,228r**	**7,089r**	**7,342**
Unclassified					
Manufactured solid fuels *(2)*	75r	55r	42r	49r	74
Coke oven gas	-	-	-	-	-
Natural gas	2	2	2	2	1
Petroleum	4,187r	4,390r	3,605r	3,693r	3,512
Bioenergy & waste	415r	449r	505r	458r	550
Total unclassified	**4,679r**	**4,895r**	**4,154r**	**4,202r**	**4,137**
Total					
Coal	1,152	1,323r	1,194r	1,212r	1,441
Manufactured solid fuels *(2)*	407r	356r	323r	359r	520
Blast furnace gas	29	87	64	26r	10
Coke oven gas	49	97	59r	43r	62
Natural gas	7,847r	8,506r	8,127r	7,870r	8,023
Petroleum	5,152r	5,482r	4,500r	4,529r	4,351
Bioenergy & waste	415r	449r	505r	458r	550
Electricity	8,576	8,987r	8,801	8,410r	8,427
Heat purchased from other sectors *(3)*	763	822	769	766r	847
Total	**24,389r**	**26,109r**	**24,344r**	**23,674r**	**24,231**

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

Thousand tonnes of oil equivalent

(except where shown otherwise)

	2009	2010	2011	2012	2013
Iron and steel and non-ferrous metals					
Coal (2)	706	633	651	521	-
Blast furnace gas	546	453	454	591r	740
Coke oven gas	200	196	196	182r	172
Natural gas	43	40	37	39r	39
Petroleum	54	9	7	7	7
Other (including renewables) (3)	55	50	60	63	58
Total fuel input (4)	**1,605**	**1,381**	**1,404**	**1,402r**	**1,016**
Electricity generated by iron & steel and non-ferrous	**459**	**425**	**429**	**370r**	**185**
metals (5) (in GWh)	5,337	4,946	4,983	4,303r	2,154
Electricity consumed by iron and steel and non-ferrous	**326**	**335**	**349**	**187**	**167**
metals from own generation (6) (in GWh)	3,795	3,895	4,065	2,170r	1,936
Chemicals					
Coal	109	110	109	110r	110
Natural gas	684	731	718	727r	693
Petroleum	6	11	6	6	6
Other (including renewables) (3)	94	51	68	46r	44
Total fuel input (4)	**892**	**937**	**900**	**888r**	**852**
Electricity generated by chemicals (5)	**376**	**407**	**379**	**378r**	**370**
(in GWh)	4,372	4,729	4,404	4,397r	4,299
Electricity consumed by chemicals from own generation (6)	**170**	**224**	**239**	**209r**	**226**
(in GWh)	1,979	2,610	2,783	2,429r	2,627
Metal products, machinery and equipment					
Coal	-	-	-	-	-
Natural gas	72	58	42	42r	42
Petroleum	6	6	6	6	6
Other (including renewables) (3)	49	50	48	48	49
Total fuel input (4)	**127**	**114**	**96**	**95r**	**97**
Electricity generated by metal products, machinery	**46**	**37**	**22**	**22r**	**24**
and equipment (5) (in GWh)	530	435	251	256r	277
Electricity consumed by metal products, machinery	**38**	**32**	**21**	**21r**	**23**
and equipment from own generation (6) (in GWh)	443	376	241	245r	266
Food, beverages and tobacco					
Coal	4	4	4	4	4
Natural gas	374	375	361	352r	366
Petroleum	5	6	4	3	3
Other (including renewables) (3)	1	4	6	9r	21
Total fuel input (4)	**384**	**388**	**375**	**367r**	**394**
Electricity generated by food, beverages and tobacco (5)	**186**	**184**	**186**	**186r**	**185**
(in GWh)	2,162	2,139	2,157	2,166r	2,154
Electricity consumed by food, beverages and tobacco	**82**	**109**	**110**	**114r**	**110**
from own generation (6) (in GWh)	959	1,264	1,277	1,328r	1,278

(1) Industrial categories used are described in Table 1l.
(2) The power plant in this category was reclassified as a Major Power Producer in 2013 so no longer appears in the autogeneration figures
(3) Includes hydro electricity, solid and gaseous renewables and waste.
(4) 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 equivalent
(except where shown otherwise)

	2009	2010	2011	2012	2013
Paper, printing and publishing					
Coal	48	32	30	26r	10
Natural gas	502	382	368	417r	351
Petroleum	1	1	0	0	0
Other (including renewables) (3)	64	75	83	94r	138
Total fuel input (4)	**615**	**489**	**480**	**538r**	**500**
Electricity generated by paper, printing and publishing (5)	**249**	**200**	**195**	**209r**	**207**
(in GWh)	2,898	2,326	2,264	2,436r	2,403
Electricity consumed by paper, printing and publishing	**163**	**111**	**126**	**141r**	**155**
from own generation (6) (in GWh)	1,894	1,292	1,468	1,637r	1,804
Other industries					
Coal	-	-	-	-	-
Coke oven gas	25	25	28	28	28
Natural gas	122	103	79	71r	55
Petroleum	4	4	6	6	5
Other (including renewables) (3)	1,815	1,881	1,921	1,926	1,933
Total fuel input (4)	**1,966**	**2,012**	**2,034**	**2,031r**	**2,021**
Electricity generated by other industries (5)	**121**	**118**	**116**	**120r**	**123**
(in GWh)	1,412	1,373	1,346r	1,399r	1,434
Electricity consumed by other industries from own	**77**	**102**	**103r**	**109r**	**115**
generation (6) (in GWh)	899	1,182	1,192r	1,273r	1,341
Total					
Coal	867	778	794	661r	124
Blast furnace gas	546	453	454	591r	740
Coke oven gas	226	221	224	210r	200
Natural gas	1,798	1,687	1,605	1,647r	1,547
Petroleum	75	35	28	27r	27
Other (including renewables) (3)	2,077	2,145	2,184	2,185r	2,243
Total fuel input (4)	**5,589**	**5,319r**	**5,289**	**5,321r**	**4,880**
Electricity generated (5)	**1,437**	**1,371**	**1,325**	**1,286r**	**1,094**
(in GWh)	16,710	15,949	15,407r	14,957r	12,722
Electricity consumed from own generation (6)	**857**	**913**	**948**	**781r**	**796**
(in GWh)	9,969	10,618	11,025r	9,082r	9,252

(5) Combined heat and power (CHP) generation (i.e. electrical output from Table 7.8) plus non-chp generation, so that the total electricity generated is consistent with the "other generators" figures in Table 5.6.

(6) 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.

(7) The figures presented here are consistent with other figures presented elsewhere in this publication as detailed at (4), (5), and (6) above but are further dissaggregated. 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:

			Thousand tonnes of oil equivalent		
Fuel input	**2009**	**2010**	**2011**	**2012**	**2013**
All industry	5,589	5,319	5,289	5,321	4,880
Fuel industries	1,254	1,349	1,731	1,943	1,845
Transport, Commerce and Administration	336	284	284	366	401
Services	1,295	1,405	1,381	1,017	1,407
Total fuel input	**8,474**	**8,357**	**8,685**	**8,647**	**8,533**
Electricity generated	**2,984**	**2,917**	**3,004**	**3,028**	**3,048**
Electricity consumed	**1,399**	**1,515**	**1,543**	**1,463**	**1,565**
			GWh		
Electricity generated	**34,707**	**33,921**	**34,939**	**35,216**	**35,446**
Electricity consumed	**16,273**	**17,618**	**17,946**	**17,009**	**18,200**

Chapter 2
Solid fuels and derived gases

Key points

- Figures for 2013 show that coal production decreased by 25 per cent on 2012 to an all-time low of 13 million tonnes in 2013 (Table 2.4), following the closure of a number of mines/companies, including Maltby, Daw Mill, Unity and Scottish Coal Company.
- Coal imports have exceeded UK coal production since 2003. In 2013 UK imports were 49 million tonnes, an increase of 10 per cent on 2012 (45 million tonnes) but 2 per cent lower than the 2006 record. (Table 2.4).
- In 2013 Russia was UK's largest supplier of coal imports with a share of 41 per cent. The USA provided 25 per cent of UK's coal imports and overtook Colombia as the second largest supplier due to a 38 per cent increase in coking coal imports. (Table 2B).
- Demand for coal between 2012 and 2013 decreased by 6 per cent, from 64 million tonnes in 2012 to 60 million tonnes in 2013 (Table 2.4), with a 9 per cent decrease in the use of coal for electricity generation.
- In 2013 around 83 per cent of demand for coal was from major power producers for electricity generation with around a further 9 per cent used for the manufacture of coke (Table 2.4).
- In 2013 there were large increases in coal, coke and breeze used in blast furnaces due to the earlier re-opening of Teesside steelworks and a new blast furnace at Port Talbot.
- Total stock levels increased in 2013 to 14.3 million tonnes, which was 1.3 million tonnes higher than in 2012, due to less consumption from generators.

Introduction

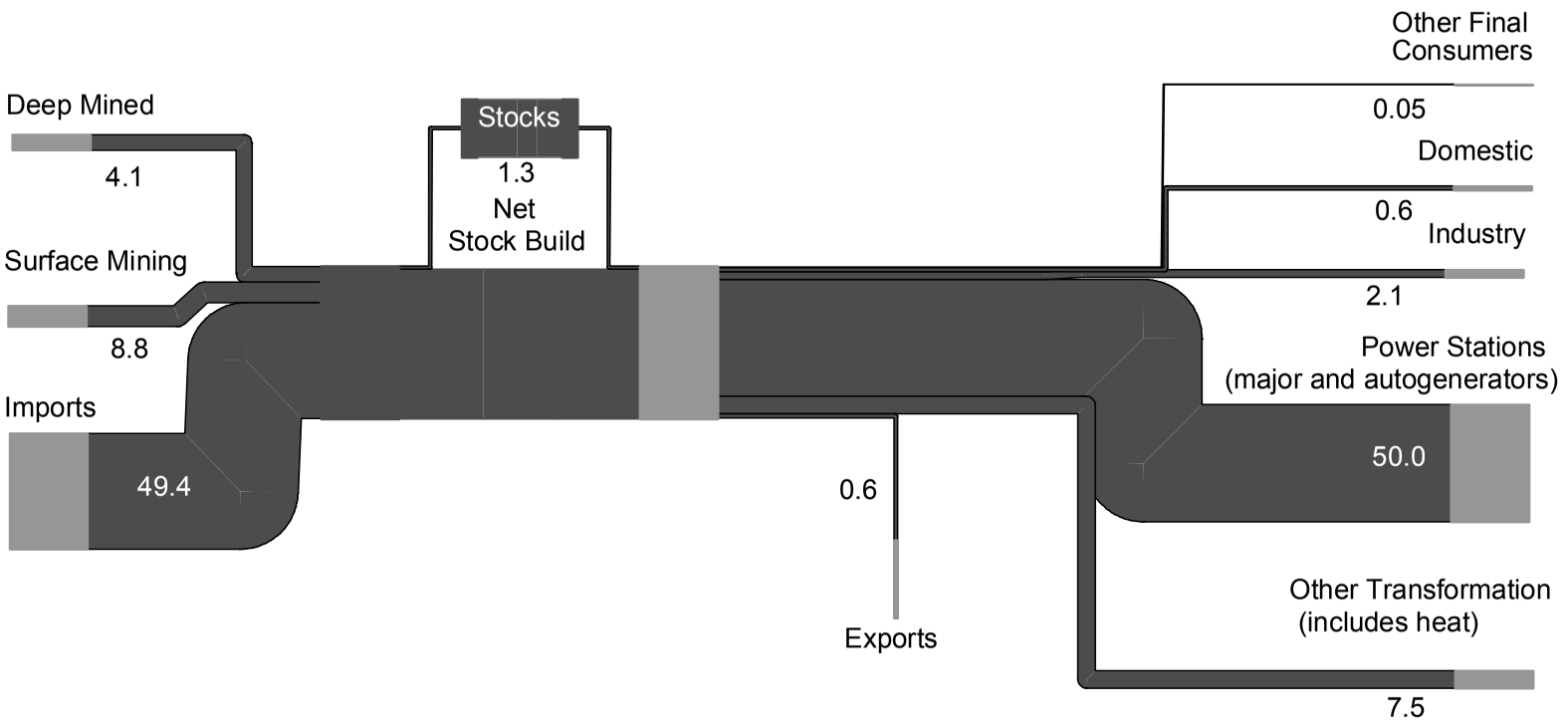
2.1 This chapter presents statistics on supply and demand for coal during the period 2011 to 2013 by grade of coal (steam coal, anthracite and coking coal). These are shown as commodity balances in Tables 2.1 to 2.3. Table 2.4 shows the same data as published in Table 2.1 to 2.3 at an aggregated level, i.e. not split by grade of coal, for the latest five years.

2.2 An energy flow chart for 2013 (page 44), shows the flows of coal from production and imports through to consumption. It is a way of simplifying the figures that can be found in the commodity balance for coal in Table 2.4. 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).

2.3 The supply and demand for manufactured solid fuels, (including coke oven coke, coke breeze, other manufactured solid fuels (patent fuel), coke oven gas, blast furnace gas and benzole and tar.) is shown in the commodity balances in Tables 2.5 and 2.6 for the latest five years.

2.4 Other data in the chapter shows: UK production and employment categorised by type of mine and devolved administration during 2011 to 2013 (Table 2A); UK imports of coal in 2013 split by grade of coal and country of origin (Table 2B); whilst Map 2A presents all UK coal production sites and ports of entry for international trade.

Coal flow chart 2013 (million tonnes of coal)



Notes:
This flow chart is based on the data that appear in Tables 2.1 and 2.4.
Surface mining includes slurry and recovered coal.

2.5 Information on long-term trends on coal production, consumption and stocks (Tables 2.1.1 and 2.1.2) are available on the DECC energy statistics web site at:
www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

2.6 Detailed statistics on imports and exports of solid fuels are shown in Annex G (Table G2), available on the DECC energy statistics web site at:
www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

Coal (Tables 2.1, 2.2, 2.3 and 2.4)

Coal Production and Trade

2.7 Figures for 2013 show that coal production including slurry decreased by 25 per cent on 2012 to an all-time low of 13 million tonnes in 2012 (Chart 2.1).

2.8 **Deep mined** production, which contributed 7 per cent to UK coal supply in 2013 (32 per cent of total UK production), fell by 34 per cent on 2012. This was due to the closure of a number of mines in 2013 (Maltby, Daw Mill and Unity) and geological conditions at some of the remaining mines. Similarly, **surface mine** production including **slurry** decreased by 20 per cent and contributed 15 per cent to UK coal supply. This was mainly due to Scottish Coal Company going into liquidation in April 2013 and geological conditions at some mines. Together, production from deep mines and surface mines accounted for 21 per cent of UK coal supply.

2.9 **Steam coal**, mainly used by power stations, accounted for 87 per cent of total coal production in 2013, with 11 per cent **anthracite** and the remainder **coking coal** (Table 2.1).

2.10 Production of slurry fell by 77 per cent from 760 thousand tonnes in 2012 to 175 thousand tonnes in 2013, mainly due to Maltby closing (Table 2.4).

2.11 Table 2A shows how production of coal is divided between England, Wales and Scotland. In 2013, 58 per cent of coal output was in England, 22 per cent in Scotland and 19 per cent in Wales. There is no longer deep mining of coal in Scotland (Map 2A).

Table 2A: Output from UK coal mines and employment in UK coal mines [1, 2]

		Million tonnes			Number		
		Output			Employment		
		2011	2012	2013	2011	2012	2013
Deep mined	England	7.2	6.0	4.0	3,184	3,114	1,882
	Wales	0.1	0.1	0.1	511	327	71
	Total	7.3	6.2	4.1	3,695	3,441	1,953
Surface mining	England	2.9	3.0	3.4	438	595	615
	Scotland	5.5	4.8	2.8	1,244	1,096	454
	Wales	2.1	2.4	2.3	595	695	693
	Total	10.6	10.1	8.6	2,277	2,386	1,762
Total	England	10.2	9.0	7.4	3,622	3,709	2,497
	Scotland	5.5	4.8	2.8	1,244	1,096	454
	Wales	2.2	2.5	2.4	1,106	1,022	764
	Total	17.9	16.3	12.7	5,972	5,827	3,715

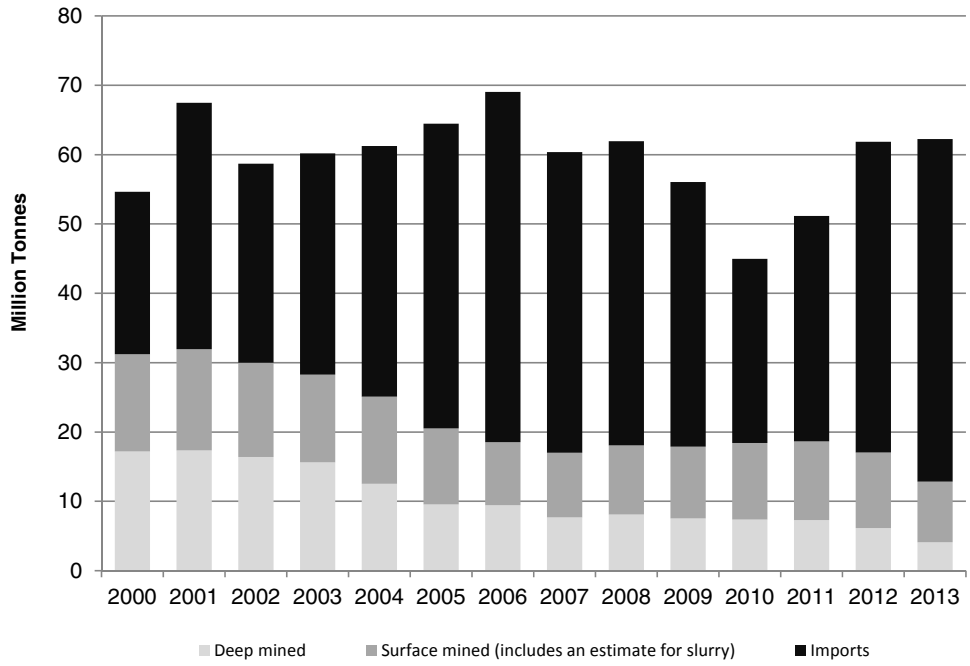
Source: The Coal Authority

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 December each year.*

2.12 Employment in the coal industry has followed a similar pattern to UK production levels. Table 2A also shows how numbers employed in the production of coal have changed over the last three years. During 2013 total employment, including contractors, was 36 per cent lower than in 2012. At 31 December 2013, 67 per cent of the 3,715 people employed in UK coal mining worked in England, while 12 per cent were employed in Scotland and 21 per cent in Wales.

2.13 Based on comparative EU statistics for 2012[1], Poland had the highest coal production, contributing 63 per cent (79 million tonnes) to the EU total. The UK was the second largest EU hard coal producer accounting for 13 per cent (16 million tonnes) of total EU production (125 million tonnes). Other EU countries such as Germany have higher lignite and brown coal production.

Chart 2.1: Coal production and imports 2000 to 2013



2.14 In 2013 UK imports were 49 million tonnes, an increase of 10 per cent on 2012 (45 million tonnes) but 2 per cent lower than the 2006 record. In 2012 UK imports had risen 38 per cent compared to 2011 (33 million tonnes).

Table 2B: Imports of coal in 2013[1]

Thousand tonnes

	Steam coal	Coking coal	Anthracite	Total
Russia	19,177	1,060	12	20,250
United States of America	9,528	2,668	0	12,196
Colombia	11,388	106	-	11,494
Australia	89	2,058	-	2,147
European Union[2]	1,111	8	109	1,228
Canada	505	56	-	561
Republic of South Africa	478	-	6	484
Other countries	719	290	33	1,043
Total all countries	**42,995**	**6,246**	**161**	**49,402**

Source: H M Revenue and Customs, ISSB

1. *Country of origin basis.*
2. *Includes non-EU coal routed through the Netherlands.*

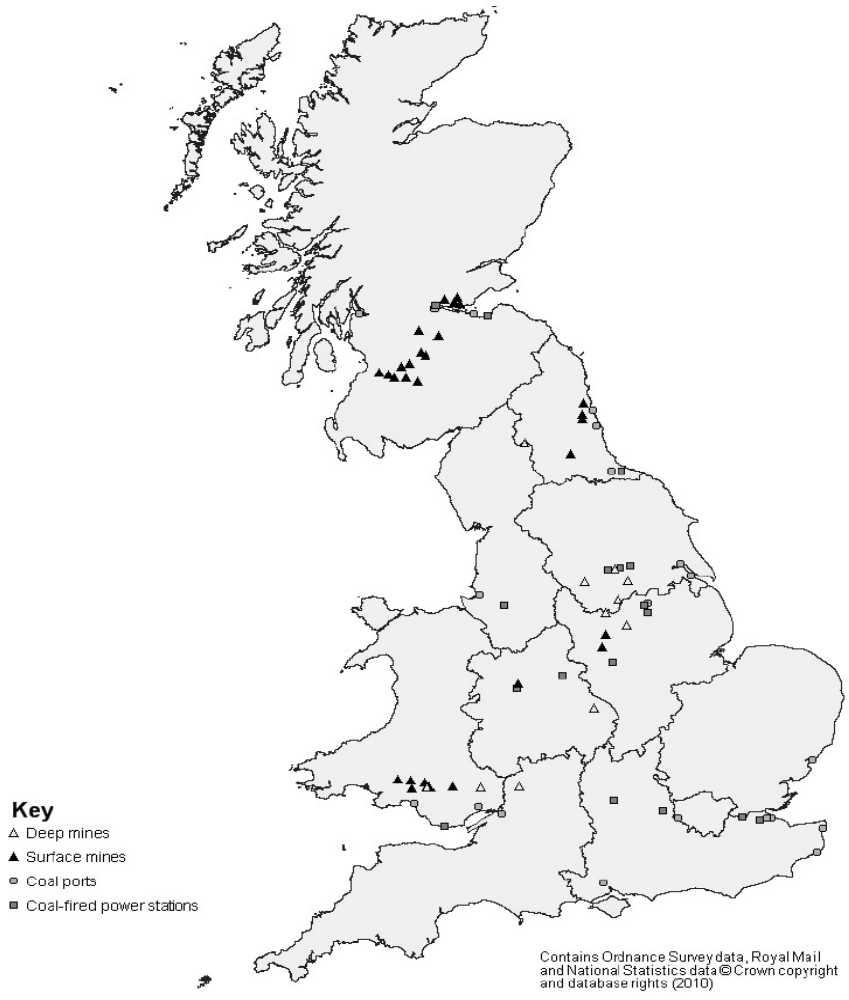
[1] *EU statistics for 2013 are not yet available on the Eurostat website http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home. The statistics being referenced refer to steam coal, anthracite and coking coal.*

2.15 Table 2B shows that, in 2013, 41 per cent (20 million tonnes) of the UK's total coal imports came from Russia and another 52 per cent (26 million tonnes) from Colombia, the USA and Australia combined.

2.16 Steam coal accounted for 87 per cent of the total imports, 13 per cent was coking coal, with anthracite accounting for the remainder. Imports from Russia increased by 12 per cent in 2013 compared to 2012, from 18 million tonnes to 20 million tonnes. In 2013, Russia accounted for 45 per cent (19 million tonnes) of total steam coal imports. A further 26 per cent (11 million tonnes) came from Colombia and 22 per cent (10 million tonnes) came from the USA. The UK imported 43 per cent (2.7 million tonnes) of coking coal from the USA with a further 33 per cent (2.1 million tonnes) from Australia. The small volume of imported anthracite coal (0.1 million tonnes) was mainly from the European Union (68 per cent) and China (21 per cent).

2.17 The UK and Germany have consistently been the top two coal importing countries in the EU. In 2012, these two countries accounted for 19 and 21 per cent respectively of total EU imports (231 million tonnes). Italy followed with an 11 per cent (24 million tonnes) share of the total[2].

Map 2A: UK coal production sites and ports



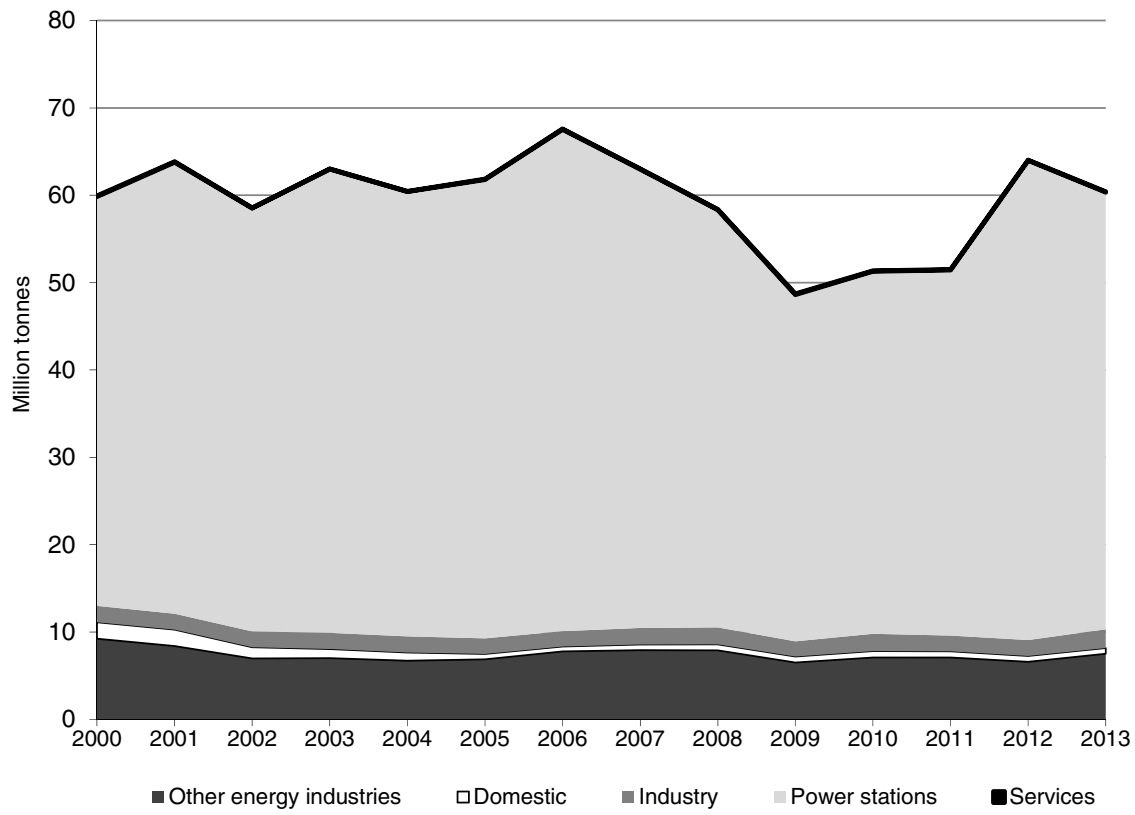
Coal Consumption

2.18 There was a significant increase of 24 per cent in the demand for coal in 2012, due to a decrease in the cost of coal and an increase in gas prices, which led to an increase in coal use for

[2] *EU statistics for 2013 are not yet available on the Eurostat website http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home. The statistics being referenced refer to hard coal (steam coal, anthracite and coking coal).*

electricity generation. However, in 2013 the demand for coal decreased by 5.7 per cent compared to 2012, as overall demand for electricity fell and more renewables were used in electricity generation. Eighty-six per cent (52 million tonnes) of demand for all coal was for steam coal, 11 per cent (6.7 million tonnes) was for coking coal and the remaining 3 per cent (1.7 million tonnes) was for anthracite. These proportions have been broadly stable in the past few years.

Chart 2.2: Coal consumption, 2000 to 2013



2.19 The transformation sector represented 95 per cent (58 million tonnes) of overall demand for coal in 2013 (60 million tonnes). Electricity generation accounted for 95 per cent of demand for steam coal and 42 per cent of demand for anthracite. Coking coal was used in coke ovens (79 per cent) and blast furnaces (21 per cent) in the UK iron and steel industry. Coking coal used in blast furnaces increased by 43 per cent from 1.0 million tonnes in 2012 to 1.4 million tonnes in 2013. This increase was due to the re-opening of Teesside steelworks in April 2012, which gradually increased operations, over the next year and the newly opened blast furnace at Port Talbot in February 2013.

2.20 Electricity generation use of coal by major power producers fell by 8.9 per cent from 55 million tonnes in 2012 to 50 million tonnes in 2013 as renewables use in electricity generation rose. Coal use by autogenerators fell by 81 per cent in 2013 from 1,064 thousand tonnes in 2012 to 200 thousand tonnes, mainly due to the reclassification of Lynemouth power station (previously used to power Rio Tinto's aluminium works) from autogenerator to major power producer following RWE's takeover in December 2012.

2.21 Coal consumption by final consumers accounted for 4.7 per cent (2.8 million tonnes) of total demand in 2013, where it was used for steam raising, space or hot water heating, or heat for processing, an increase of 12 per cent from 2012. Steam coal accounted for 72 per cent of this final consumption (down 11 per cent from 2012).

2.22 The industrial sector is the largest final consumer (accounting for 76 per cent of total final consumption in 2013). Seventy-five per cent of the coal used in the industrial sector was steam coal, with mineral products (e.g. cement, glass and brick production) being the largest users.

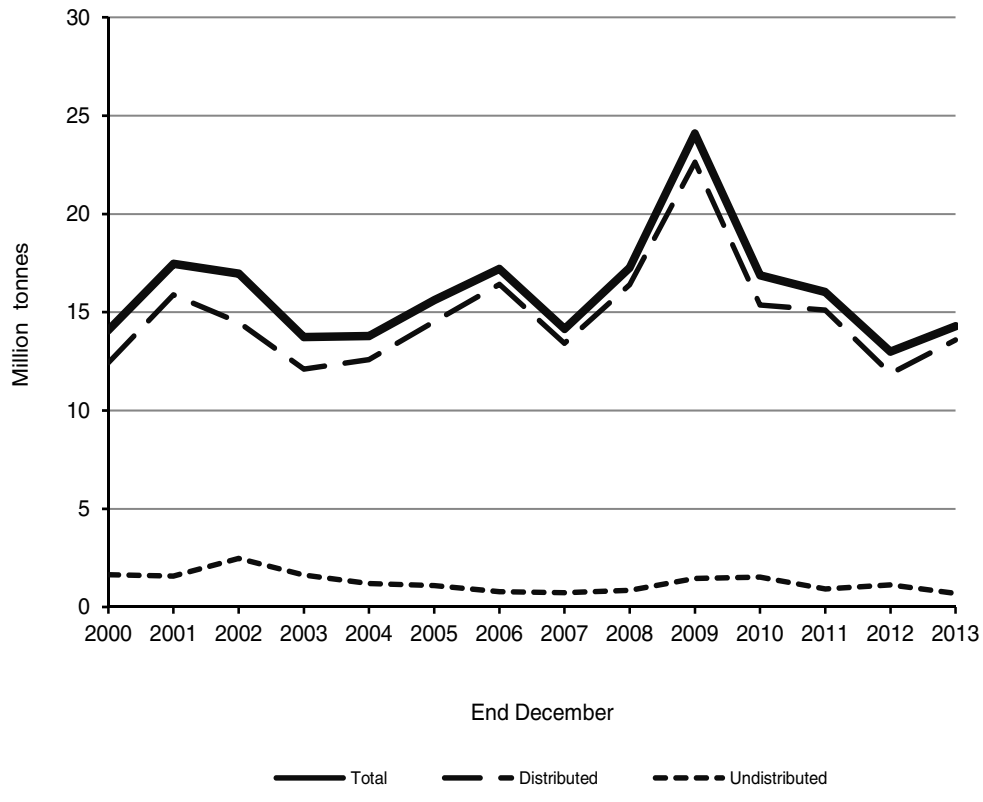
2.23 The domestic sector accounted for 23 per cent of the final consumption of coal, with 59 per cent of this demand being for steam coal and the remainder for anthracite. Domestic consumption fell by 4.1 per cent in 2013 compared to 2012.

2.24 In 2012, the UK became the second largest consumer of coal among the EU countries, after eleven years running of being third, accounting for 19 per cent (64 million tonnes) of total coal consumption in the EU (330 million tonnes). The top consumer was Poland accounting for 23 per cent (76 million tonnes) of total EU consumption, while Germany was third accounting for 18 per cent (60 million tonnes)[3].

Coal Stocks

2.25 In 2009 total stocks rose to 24 million tonnes (Chart 2.3), the highest since 1994 (27 million tonnes). Total stock levels have declined since then, but rose to 14 million tonnes at the end of 2013, 1.3 million tonnes more than total stocks held at the end of 2012. Undistributed stocks (stocks held at collieries and surface mine sites) of 0.7 million tonnes at the end of 2013 were 0.4 million tonnes lower than a year earlier, but stocks at major power stations and coke ovens, as a whole, increased by 2.0 million tonnes as demand fell and accounted for 87 per cent of total stocks in 2013.

Chart 2.3: Coal stocks in the UK 2000 to 2013



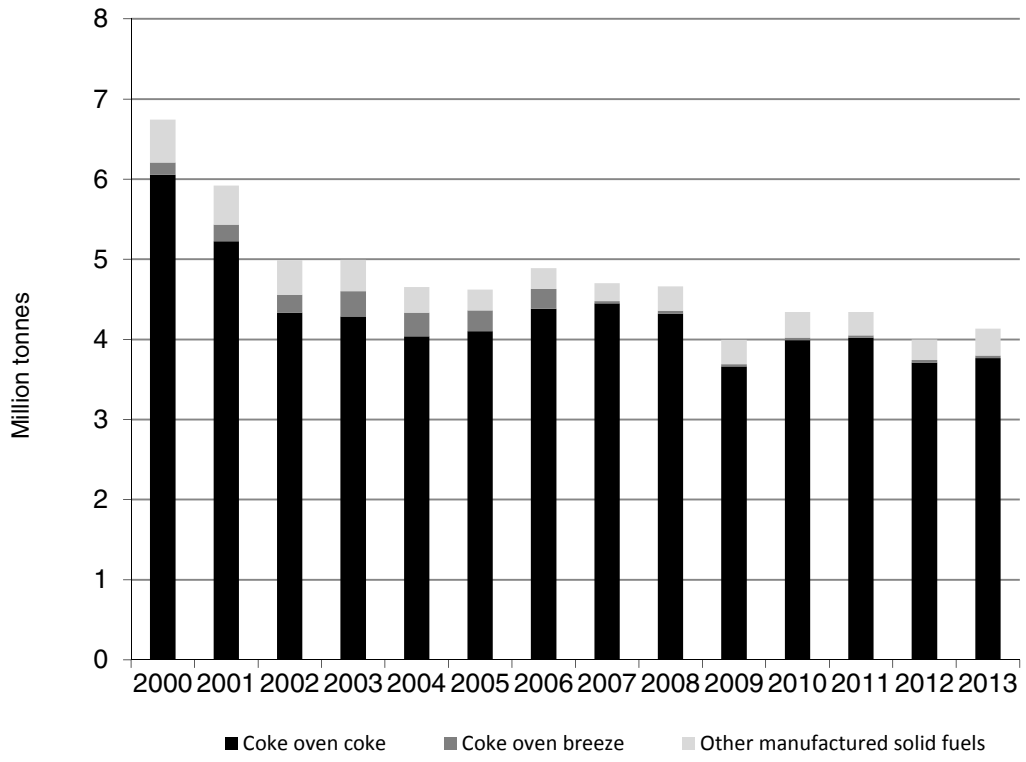
[3] *EU statistics for 2013 are not yet available on the Eurostat website http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home. The statistics being referenced refer to hard coal (steam coal, anthracite and coking coal).*

Manufactured Solid Fuels (Tables 2.5 and 2.6)

Production, Trade and Consumption

2.26 In 2013, around 91 per cent of manufactured solid fuel production was **coke oven coke**, a proportion that has remained the same for the past 15 years. In 2013, 83 per cent of the UK's supply of coke oven coke was home produced, with the remainder being imported, chiefly from the USA (2.7 million tonnes) and Australia (2.1 million tonnes). Between 2012 and 2013, home produced coke oven coke increased by 1.5 per cent to 3.8 million tonnes. Export levels fell to 0.1 million tonnes in 2013, down from 0.5 million tonnes in 2012.

Chart 2.4: Total manufactured solid fuels production in the UK 2000 to 2013



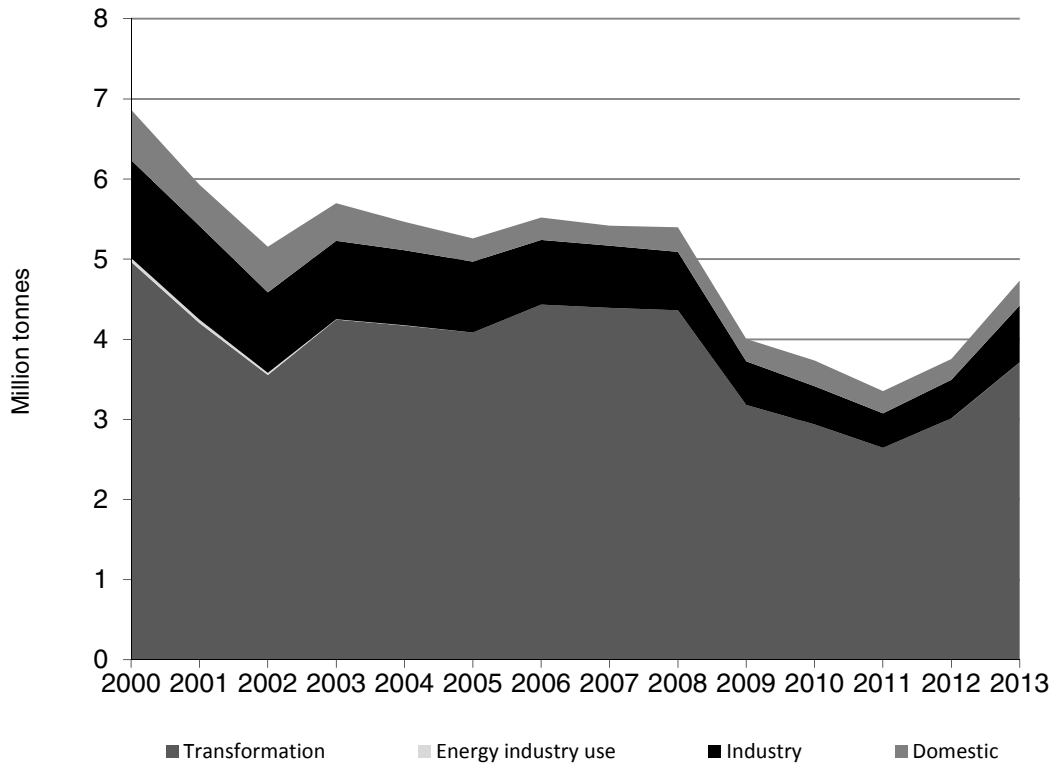
2.27 The main purpose of coke oven coke is for use in blast furnaces in the UK iron and steel industry. In 2013, this represented 97 per cent of total demand (3.2 million tonnes), and was 22 per cent higher than in 2012 (2.7 million tonnes). The rest of production was added to stocks. This increase was due to the re-opening of Teesside steelworks in April 2012 which gradually increased operations over the next year, and the newly opened furnace at Port Talbot in February 2013.

2.28 Most of the supply of **coke breeze** is from re-screened coke oven coke, with direct production accounting for only 3.0 per cent of total supply in 2013. In 2013, 41 per cent of coke breeze was used in blast furnaces (0.4 million tonnes) for transformation and 59 per cent used for final consumption (Chart 2.5).

2.29 Other manufactured solid fuels (patent fuels) are manufactured smokeless fuels, produced mainly for the domestic market. A small amount of these fuels (only 4.8 per cent of total supply in 2013) was imported, but exports generally exceed this.

2.30 The carbonisation and gasification of solid fuels in coke ovens produces coke oven gas as a by-product. In 2013, production of coke oven gas was 2.7 per cent higher than in 2012 (8.3 TWh). Some of this (43 per cent) was used to fuel the coke ovens themselves and, of the rest, 27 per cent was used for electricity generation, 8.5 per cent for iron and steel and other industrial processes (including heat production), 10 per cent in blast furnaces and 4.5 per cent was lost.

Chart 2.5: Total manufactured solid fuels consumption in the UK 2000 to 2013



2.31 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 (BOS) converters and "BOS" gas is included in this category. Most of these gases are used in other parts of integrated steel works. Production of blast furnace gas increased by 33 per cent in 2013 compared to 2012. The generation of electricity in 2013 used 55 per cent of total blast furnace gas and BOS gas, while 29 per cent was used in coke ovens and blast furnaces themselves, 1.2 per cent used in general heat production, 14 per cent was lost or burned as waste and a further 0.7 per cent was used in the iron and steel industry. [4] There was a large increase in losses of blast furnace gas from 817 GWh in 2012 to 2,105 GWh in 2013, due to a fire at Scunthorpe that damaged a generator turbine and problems at another steel plant.

2.32 Demand for benzole and tars increased by 5.6 per cent from 2012 (1.5 TWh), to 1.6 TWh in 2013, all of which was met by domestic production. From 2009, based on information from the EU-ETS, all consumption of these products has been allocated to non-energy use – see also paragraph 2.54 (d) and (e).

[4] *A flow chart showing the use of coal, manufactured fuels and derived gases in the UK Iron and Steel industry can be found in the quarterly publication, Energy Trends for June 2011. This is available on the national archive website: http://webarchive.nationalarchives.gov.uk/20130109092117/http://decc.gov.uk/assets/decc/11/stats/publications/energy-trends/2076-trendsjun11.pdf*

Technical notes and definitions

2.33 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 1.28 to 1.63. Additional guidance on the compilation of the solid fuels and derived gases statistics can be found in the document 'Data Sources and Methodologies', this document is available on the DECC energy statistics web site at: www.gov.uk/government/collections/coal-statistics. For notes on the commodity balances and definitions of the terms used in the row headings see Annex A. 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 website.

Coal production

2.34 **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.

2.35 **Surface** mines: 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. The term 'surface mining' has now replaced opencast production as defined in DUKES pre-2011. Opencast production is a particular type of surface mining technique.

2.36 **Other sources/Slurry**: Estimates of slurry etc recovered and disposed of from dumps, ponds, rivers, etc.

Steam coal, coking coal and anthracite

2.37 **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.

2.38 **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.

2.39 **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.

Allocation of imported coal

2.40 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. Guidance on how DECC allocate imports to final users is outlined in paragraph 3.2.5 of the 'Data Sources and Methodologies' document. This guidance can be found on the DECC website at: www.gov.uk/government/collections/coal-statistics.

Coal consumption

2.41 Figures for actual consumption of coal are available for all fuels 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.

2.42 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 six main coal producers and a few small producers to the iron and steel industry (excluding that used at coke ovens and blast furnaces) and to other industrial sectors, estimated proportions of anthracite and steam coal imports, and submission made to the EU Emissions Trading Scheme. 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 2012 is estimated at 64.2 thousand tonnes. This estimate is included in the domestic steam coal and domestic anthracite figures.

Stocks of coal

2.43 Undistributed stocks are those held at collieries and surface mine 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, paragraphs 5.71 and 5.72), coke ovens, low temperature carbonisation plants and patent fuel plants.

Coke oven coke (hard coke), hard coke breeze and other manufactured fuels

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 2.45, below). Breeze (as defined in paragraph 2.46) is excluded from the figures for coke oven coke.

2.45 Breeze can generally be described as coke screened below 19 mm (¾ 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 The coke screened out by producers as breeze and fines 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. Since 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.

2.47 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.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes.

2.48 However, in Table 2.5, 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.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes.

2.49 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 Table 2.5.

2.50 The calorific value for coke breeze has been set the same as for coke oven coke. This is following information from the Iron and Steel industry on the similarities between the two types of manufactured fuels.

2.51 Imports and exports of manufactured smokeless fuels can contain small quantities of non-smokeless fuels.

2.52 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.

2.53 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.

Blast furnace gas, coke oven gas, benzole and tars

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

(a) 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 (BOS) 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.

(b) Coke oven gas: is a gas produced during the carbonisation of coal to form coke at coke ovens. In 2009, some coke oven gas was produced using a combination of gases other than natural gas and blast furnace gas. This total has been added to the production of coke oven gas rather than transfers because it is specifically defined as the mixture of natural gas, blast furnace gas and BOS gas. See the paragraph below on synthetic coke oven gas for a complete definition of this.

(c) 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 Table 2.6 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.

(d) Benzole: a colourless, liquid, flammable, aromatic hydrocarbon by-product of the iron and steel making process. It is used in the UK as a solvent in the manufacture of styrenes and phenols. All consumption of benzole has been allocated to non-energy use from 2009 onwards.

(e) Tars: viscous materials usually derived from the destructive distillation of coal, which are by-products of the coke and iron making processes. . All consumption of tars has been allocated to non-energy use from 2009 onwards.

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2.1 Commodity balances 2013

Coal

Thousand tonnes

	Steam coal	Coking coal	Anthracite	Total
Supply				
Production	11,078	179	1,415	12,673
Other sources	95	-	80	175
Imports	42,995	6,246	161	49,402
Exports	-443	-9	-142	-593
Marine bunkers				
Stock change *(1)*	-1,818	+312	207	-1,298
Transfers				
Total supply	**51,908**	**6,729**	**1,722**	**60,358**
Statistical difference *(2)*	-84	30	+7	-46
Total demand	**51,991**	**6,698**	**1,715**	**60,405**
Transformation	**49,943**	**6,698**	**920**	**57,561**
Electricity generation	49,329	-	713	50,042
Major power producers	49,129	-	713	49,842
Autogenerators	200	-	-	200
Heat generation	609	-	-	609
Petroleum refineries	-	-	-	
Coke manufacture	-	5,288	-	5,288
Blast furnaces	-	1,411	-	1,411
Patent fuel manufacture and low temperature carbonisation	5	-	207	212
Energy industry use	**3**	**-**	**-**	**3**
Electricity generation	-	-	-	-
Oil and gas extraction	-	-	-	-
Petroleum refineries	-	-	-	-
Coal extraction	3	-	-	3
Coke manufacture	-	-	-	-
Blast furnaces	-	-	-	-
Patent fuel manufacture	-	-	-	-
Pumped storage	-	-	-	-
Other	-	-	-	-
Losses	-	-	-	-
Final consumption	**2,046**	**-**	**795**	**2,841**
Industry	**1,615**	**-**	**532**	**2,147**
Unclassified	-	-	-	-
Iron and steel	2	-	51	53
Non-ferrous metals	23	-	-	23
Mineral products	1,170	-	0	1,170
Chemicals	86	-	-	86
Mechanical engineering etc	12	-	-	12
Electrical engineering etc	6	-	-	6
Vehicles	52	-	-	52
Food, beverages etc	25	-	19	44
Textiles, leather, etc	59	-	-	59
Paper, printing etc	121	-	-	121
Other industries	53	-	462	515
Construction	6	-	-	6
Transport	**14**	**-**	**-**	**14**
Air				
Rail *(3)*	14	-	-	14
Road	-	-	-	-
National navigation	-	-	-	-
Pipelines				
Other	**417**	**-**	**263**	**680**
Domestic	383	-	263	646
Public administration	22	-	-	22
Commercial	5	-	-	5
Agriculture	-	-	-	-
Miscellaneous	7	-	-	7
Non energy use	**-**	**-**	**-**	**-**

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

(2) Total supply minus total demand.

(3) Estimate revised following research carried out into heritage railways.

2.2 Commodity balances 2012

Coal

Thousand tonnes

	Steam coal	Coking coal	Anthracite	Total
Supply				
Production	14,691	386	1,210	16,287
Other sources	680	-	80	760
Imports	39,619	5,071	125	44,815
Exports	-365	-13	-110	-488
Marine bunkers	-	-	-	-
Stock change *(1)*	+2,585	+525r	-142r	+2,967r
Transfers	-	-	-	-
Total supply	**57,209**	**5,968r**	**1,163r**	**64,340r**
Statistical difference *(2)*	+210r	16r	+84r	+310r
Total demand	**57,000r**	**5,952**	**1,079r**	**64,030r**
Transformation	**54,897r**	**5,952**	**637r**	**61,486r**
Electricity generation	54,431r	-	470	54,901r
Major power producers	53,367	-	470	53,837
Autogenerators	1,064r	-	-	1,064r
Heat generation	461r	-	-	461r
Petroleum refineries	-	-	-	
Coke manufacture	-	4,965	-r	4,965r
Blast furnaces	-	987	-	987
Patent fuel manufacture and low temperature carbonisation	5r	-	167r	172r
Energy industry use	**4**	**-**	**-**	**4**
Electricity generation	-	-	-	-
Oil and gas extraction	-	-	-	-
Petroleum refineries	-	-	-	-
Coal extraction	4		**-**	4
Coke manufacture	-	-	-	-
Blast furnaces	-	-	-	-
Patent fuel manufacture	-	-	-	-
Pumped storage	-	-	-	-
Other	-	-	-	-
Losses	-	-	-	-
Final consumption	**2,099r**	**-**	**442r**	**2,541r**
Industry	**1,584r**	**-**	**243r**	**1,826r**
Unclassified	-	-	-	-
Iron and steel	2	-	49	51
Non-ferrous metals	21	-	-	21
Mineral products	1,123r	-	0	1,123r
Chemicals	76	-	-	76
Mechanical engineering etc	11	-	-	11
Electrical engineering etc	5	-	-	5
Vehicles	50	-	-	50
Food, beverages etc	27	-	17	44
Textiles, leather, etc	62	-	-	62
Paper, printing etc	138r	-	-	138r
Other industries	62	-	177r	239r
Construction	6	-	-	6
Transport	**16**	**-**	**-**	**16**
Air	-	**-**	**-**	**-**
Rail *(3)*	16	-	-	16
Road	**-**	**-**	**-**	**-**
National navigation	**-**	**-**	**-**	**-**
Pipelines	**-**	**-**	**-**	**-**
Other	**499r**	-	**199**	**698**
Domestic	475	-	199	674
Public administration	12	-	-	12
Commercial	5	-	-	5
Agriculture	1	-	-	1
Miscellaneous	6	-	-	6
Non energy use	**-**	**-**	**-**	**-**

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

(2) Total supply minus total demand.

(3) Estimate revised following research carried out into heritage railways.

2.3 Commodity balances 2011

Coal

Thousand tonnes

	Steam coal	Coking coal	Anthracite	Total
Supply				
Production	16,336	383	1,173	17,892
Other sources	660	-	75	735
Imports	26,472	5,908	148	32,527
Exports	-391	-3	-97	-491
Marine bunkers	-	-	-	-
Stock change *(1)*	+874	-17	-21	+836
Transfers	-	-	-	-
Total supply	**43,951**	**6,270**	**1,279**	**51,499r**
Statistical difference *(2)*	-85	-7	+91r	-1r
Total demand	**44,036r**	**6,277**	**1,188r**	**51,500r**
Transformation	**41,936**	**6,277**	**716r**	**48,928r**
Electricity generation	41,345	-	505	41,850r
Major power producers	40,061	-	505	40,566
Autogenerators	1,284	-	-	1,284
Heat generation	562	-	-	562
Petroleum refineries	-	-	-	
Coke manufacture	-	5,282	-r	5,282r
Blast furnaces	-	995	-	995
Patent fuel manufacture and low temperature carbonisation	29	-	211r	240r
Energy industry use	**4**	**-**	**-**	**4**
Electricity generation	-	-	-	-
Oil and gas extraction	-	-	-	-
Petroleum refineries	-	-	-	-
Coal extraction	4	-	-	4
Coke manufacture	-	-	-	-
Blast furnaces	-	-	-	-
Patent fuel manufacture	-	-	-	-
Pumped storage	-	-	-r	-
Other	-	-	-	-
Losses	-	-	-	-
Final consumption	**2,096**	**-**	**472r**	**2,568r**
Industry	**1,541**	**-**	**257r**	**1,798r**
Unclassified	-	-	-	-
Iron and steel	2	-	51	53
Non-ferrous metals	23	-	-	23
Mineral products	1,056	-	0	1,056
Chemicals	78	-	-	78
Mechanical engineering etc	11	-	-	11
Electrical engineering etc	5	-	-	5
Vehicles	53	-	-	53
Food, beverages etc	26	-	20	45
Textiles, leather, etc	64	-	-	64
Paper, printing etc	122	-	-	122
Other industries	94	-	186r	280r
Construction	7	-	-	7
Transport	**15**	**-**	**-**	**15**
Air	-	-	-	-
Rail *(3)*	15	-	-	15
Road	-	-	-	-
National navigation	-	-	-	-
Pipelines	-	-	-	-
Other	**540**	**-**	**215**	**755**
Domestic	501	-	215	716
Public administration	26	-	-	26
Commercial	5	-	-	5
Agriculture	1	-	-	1
Miscellaneous	7	-	-	7
Non energy use	**-**	**-**	**-**	**-**

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

(2) Total supply minus total demand.

(3) Estimate revised following research carried out into heritage railways.

2.4 Supply and consumption of coal

Thousand tonnes

	2009	2010	2011	2012	2013
Supply					
Production	17,374	17,817	17,892	16,287	12,673
Deep-mined	7,520	7,390	7,312	6,153	4,089
Surface mining *(1)*	9,854	10,426	10,580	10,134	8,584
Other sources *(2)*	500	600	735	760	175
Imports	38,167	26,541	32,527	44,815	49,402
Exports	-646	-715	-491	-488	-593
Stock change *(3)*	-6,609r	+7,206	+836	+2,967r	-1,298
Total supply	**48,785r**	**51,448**	**51,499r**	**64,340r**	**60,358**
Statistical difference *(4)*	+67r	+94	-1r	+310r	-46
Total demand	**48,718r**	**51,354r**	**51,500r**	**64,030r**	**60,405**
Transformation	**46,188r**	**48,584r**	**48,928r**	**61,486r**	**57,561**
Electricity generation	39,681	41,498	41,850	54,901r	50,042
Major power producers	38,262	40,230	40,566	53,837	49,842
Autogenerators	1,419	1,268	1,284	1,064r	200
Heat generation	482	477	562	461r	609
Coke manufacture	4,936	5,399r	5,282r	4,965r	5,288
Blast furnaces	852	978	995	987	1,411
Patent fuel manufacture and low temperature carbonisation	238r	231r	240r	172r	212
Energy industry use	**5**	**5**	**4**	**4**	**3**
Coal extraction	5	5	4	4	3
Final consumption	**2,525**	**2,766r**	**2,568r**	**2,541r**	**2,841**
Industry	**1,742**	**1,975r**	**1,798r**	**1,826r**	**2,147**
Unclassified	-	-	-	-	-
Iron and steel	60	64r	53r	51	53
Non-ferrous metals	28	24	23r	21	23
Mineral products	1,077	1,063	1,056	1,123r	1,170
Chemicals	77	79	78	76	86
Mechanical engineering etc	14	13	11	11	12
Electrical engineering etc	5	5	5	5	6
Vehicles	46	51	53	50	52
Food, beverages etc	48	43r	45	44	44
Textiles, clothing, leather, etc	69	67	64	62	59
Pulp, paper, printing etc	124	123	122	138r	121
Other industries	191	440r	280r	239r	515
Construction	4	4	7	6	6
Transport	**19**	**19**	**15**	**16**	**14**
Other	**765**	**772r**	**755**	**698**	**680**
Domestic	689	733r	716	674	646
Public administration	24	28	26	12	22
Commercial	49	4	5	5	5
Agriculture	-	1	1	1	-
Miscellaneous	3	6	7	6	7
Non energy use					
Stocks at end of year *(5)*					
Distributed stocks	22,641r	15,368r	15,114r	11,882r	13,589
Of which:					
Major power producers	21,770	13,370	13,496	9,561	11,871
Coke ovens	806	1,338	1,355	831r	518
Undistributed stocks	1,450	1,517	926	1,120	696
Total stocks *(6)*	**24,091r**	**16,884r**	**16,040r**	**13,002r**	**14,284**

(1) The term 'surface mining' has now replaced opencast production. Opencast production is a surface mining technique.
(2) Estimates of slurry etc. recovered from ponds, dumps, rivers, etc.
(3) Stock fall (+), stock rise (-).
(4) Total supply minus total demand.
(5) Excludes distributed stocks held in merchants' yards, etc., mainly for the domestic market, and stocks held by the industrial sector.
(6) For some years, closing stocks may not be consistent with stock changes, due to additional stock adjustments.

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

Thousand tonnes

	2009	2010	2011	2012	2013
Coke oven coke					
Supply					
Production	3,663	3,990	4,021	3,712	3,769
Imports	140	44	-	147	764
Exports	-97	-437	-427	-450	-75
Stock change *(1)*	-79	-145	-520	+341	+178
Transfers	-784	-833	-744	-1,021	-1,277
Total supply	**2,843**	**2,619**	**2,331**	**2,729r**	**3,358**
Statistical difference *(2)*	**-**	**-**	**-**	**-**	**0**
Total demand	**2,843**	**2,619**	**2,331**	**2,729r**	**3,358**
Transformation	**2,755**	**2,554**	**2,287**	**2,674**	**3,271**
Blast furnaces	2,755	2,554	2,287	2,674	3,271
Energy industry use	**-**	**-**	**-**	**-**	**-**
Final consumption	**88**	**66**	**44**	**55**	**87**
Industry	**78**	**55**	**35**	**48**	**82**
Unclassified	71	48	28	35	69
Iron and steel	7	7	7	13	12
Non-ferrous metals	**-**	**-**	**-**	**-**	**-**
Other	**10**	**10**	**9**	**7**	**6**
Domestic	10	10	9	7	6
Stocks at end of year *(3)*	**319**	**464**	**972**	**393**	**195**
Coke breeze					
Supply					
Production *(4)*	29	32	31	31	32
Imports	38	69	26	46	55
Exports	-49	-46	-40	-71	-11
Stock change *(1)*	+89	-83	-8	-255	-283
Transfers	784	833	744	1,021	1,277
Total supply	**892**	**805**	**753**	**772**	**1,069**
Statistical difference *(2)*	**-**	**-**	**-**	**-**	**-**
Total demand	**892**	**805**	**753**	**772**	**1,069**
Transformation	**426**	**384**	**358**	**340r**	**442**
Coke manufacture	**-**	**-**	**-**	**-**	**-**
Blast furnaces	426	384	358	340r	442
Energy industry use	**-**	**-**	**-**	**-**	**-**
Final consumption	**466**	**421**	**395**	**432r**	**627**
Industry	**466**	**421**	**395**	**432r**	**627**
Unclassified	7	4	7	10	14
Iron and steel	460	416	388	422r	614
Stocks at end of year *(3)*	**246**	**279**	**210**	**437**	**477**
Other manufactured solid fuels					
Supply					
Production	303	318	289	258	336
Imports	6	10	21	15	15
Exports	-31	-35	-32	-32	-30
Stock change *(1)*	-10	+13	-13	+7	-17
Total supply	**268**	**306**	**265**	**248**	**303**
Statistical difference *(2)*	-1	-5	-4	-5	-1
Total demand	**269**	**311**	**270**	**253**	**304**
Transformation	**-**	**-**	**-**	**-**	**-**
Energy industry use	**-**	**-**	**-**	**-**	**-**
Patent fuel manufacture	**-**	**-**	**-**	**-**	**-**
Final consumption	**269**	**311**	**270**	**253**	**304**
Industry	**-**	**-**	**-**	**-**	**-**
Unclassified	**-**	**-**	**-**	**-**	**-**
Other	**269**	**311**	**270**	**253**	**304**
Domestic	269	311	270	253	304
Stocks at end of year *(3)*	**33**	**18**	**32**	**24**	**42**

(1) Stock fall (+), stock rise (-).
(2) Total supply minus total demand.
(3) Producers stocks and distributed stocks.
(4) See paragraph 2.29.

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

GWh

	2009	2010	2011	2012	2013
Coke oven gas					
Supply					
Production	7,956	8,822	8,845r	8,254r	8,479
Imports	-	-	-	-	-
Exports	-	-	-	-	-
Transfers *(1)*	+366	+274	+62	+60	+59
Total supply	**8,322**	**9,096**	**8,907r**	**8,313r**	**8,539**
Statistical difference *(2)*	-62	-62	-62	-1r	-16
Total demand	**8,383**	**9,158**	**8,969r**	**8,315r**	**8,555**
Transformation	**3,044**	**2,984**	**3,019**	**2,858r**	**2,741**
Electricity generation	2,626	2,566	2,601	2,440r	2,322
Heat generation	418	418	418	418	418
Other	-	-	-	-	-
Energy industry use	**4,471**	**4,235**	**4,300**	**4,564r**	**4,525**
Coke manufacture	3,888	3,861	3,832	3,813r	3,643
Blast furnaces	583	374	469	750r	882
Other	-	-	-	-	-
Losses	**75**	**617**	**758**	**192**	**389**
Final consumption	**794**	**1,321**	**891r**	**701r**	**900**
Industry	**794**	**1,321**	**891r**	**701r**	**900**
Unclassified	230	198	200	198	174
Iron and steel	564	1,123	691r	503r	726
Blast furnace gas					
Supply					
Production	11,199	11,404	10,503	11,692	15,515
Imports	-	-	-	-	-
Exports	-	-	-	-	-
Transfers *(1)*	-15	-11	-2	-4	-4
Total supply	**11,184**	**11,393**	**10,501**	**11,688**	**15,511**
Statistical difference *(2)*	-66	-71	-70	-48r	-13
Total demand	**11,250**	**11,464**	**10,571**	**11,737r**	**15,525**
Transformation	**6,531**	**5,444**	**5,462**	**7,048r**	**8,782**
Electricity generation	6,352	5,265	5,283	6,869r	8,602
Heat generation	179	179	179	179	179
Other	-	-	-	-	-
Energy industry use	**3,657**	**3,674**	**3,370**	**3,569**	**4,516**
Coke manufacture	506	732	657	672	751
Blast furnaces	3,151	2,943	2,713	2,897	3,765
Other	-	-	-	-	-
Losses	**724**	**1,335**	**993**	**817**	**2,111**
Final consumption	**337**	**1,010**	**746**	**303r**	**116**
Industry	**337**	**1,010**	**746**	**303r**	**116**
Unclassified	-	-	-	-	-
Iron and steel	337	1,010	746	303r	116
Benzole and tars *(3)*					
Supply					
Production	1,536	1,696	1,657	1,543	1,630
Final consumption *(4)*	**1,536**	**1,696**	**1,657**	**1,543**	**1,630**
Unclassified	-r	-r	-r	-r	-
Iron and steel	-	-	-	-	-
Non energy use	1,536r	1,696r	1,657r	1,543r	1,630

(1) To and from synthetic coke oven gas, see paragraph 2.53.
(2) Total supply minus total demand.
(3) Because of the small number of benzole suppliers, figures for benzole and tars cannot be given separately.
(4) from 2009, unclassified final consumptionhas been recorded under non energy use

2.7 Deep mines and surface mines in production at 31 December 2013

Deep mines[1]

Licensee	Site Name	Location
Ayle Colliery Company Ltd	Ayle Colliery	Northumberland
Energybuild Ltd	Aberpergwm Colliery	Neath Port Talbot
European Coal Products Ltd	Eckington Colliery	Derbyshire
Grimebridge Colliery Company Ltd	Hill Top Colliery	Lancashire
Hatfield Colliery Partnership Ltd	Hatfield Colliery	Doncaster
Ray Ashly, Richard Daniels and Neil Jones	Monument Colliery	Gloucestershire
Three D's Mining Ltd	Dan-y-Graig No.4 Colliery	Neath Port Talbot
UK Coal Kellingley Ltd	Kellingley Colliery	North Yorkshire
UK Coal Thoresby Ltd	Thoresby Colliery	Nottinghamshire

Surface mines[2]

Licensee	Site Name	Location
Bryn Bach Coal Ltd	Glan Lash	Carmarthenshire
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 & Company Ltd	Brenkley Lane	Newcastle upon Tyne
	Rusha Site	West Lothian
	Shotton	Northumberland
Hall Construction Services Ltd	Earlseat	Fife
Kier Minerals Ltd	Greenburn Project	East Ayrshire
Land Engineering Services Ltd	Comrie Colliery Site	Fife
Miller Argent (South Wales) Ltd	Ffos-y-Fran Land Reclamation Scheme	Merthyr Tydfil
Newcastle Science Central LLP	Science Central	Newcastle upon Tyne
OCCW (Duncanziemere) Ltd	Laigh Glenmuir Site	East Ayrshire
OCCW (Netherton) Ltd	Netherton	East Ayrshire
Tower Regeneration Ltd	Tower Colliery Surface Mining Site	Rhondda Cynon Taff
UK Coal Surface Mines Ltd	Butterwell Disposal Point	Northumberland
	Lodge House	Derbyshire
	Minorca	Leicestershire
	Park Wall North	Durham
	Potland Burn	Northumberland

(1) In addition, there were 2 underground mines on care & maintenance :-
Harworth Colliery in Nottinghamshire licensed to UK Coal Harworth Ltd
Unity Mine in Neath Port Talbot licensed to Unity Mine Ltd

(2) In addition, there were 6 surface mines on care & maintenance :-
Glenmuckloch site in Dumfries & Galloway licensed to Aardvark TMC Ltd (in liquidation)
Muir Dean site in Fife licensed to Aardvark TMC Ltd (in liquidation)
Bwlch Ffos site in Neath Port Talbot licensed to Horizon Mining Ltd (in administration)
Broken Cross site in South Lanarkshire licensed to the Scottish Coal Company Ltd (in liquidation)
House of Water site in East Ayrshire licensed to the Scottish Coal Company Ltd (in liquidation)
St Ninians site in Fife licensed to the Scottish Coal Company Ltd (in liquidation)

Source: The Coal Authority

Chapter 3
Petroleum

Key points

- Production of crude oil and Natural Gas Liquids from the UK's North Sea fields decreased by 9 per cent between 2012 and 2013, broadly in line with the post 1999 decline. Production is now around thirty per cent of the UK's peak production of 1999 (Table 3.1, Chart 3.1).
- Despite the decrease in oil production, refinery demand remained low so that trade in primary oils was similar to 2012. Exports were virtually identical to 2012 whilst imports are slightly down (Table 3.1, Chart 3.1).
- Following the closure of the Coryton refinery in summer 2012, the UK now has seven refineries that produced 64.7 million tonnes of product in 2013, down 6 per cent from 68.6 million tonnes in 2012. Production loss from the closure of Coryton in 2012 has not been made up by other refineries and several disruptions occurred throughout 2013, most notably the temporary closure of Grangemouth in October. Overall UK production is around a quarter lower than in 2000 (Table 3.2, Chart 3.4).
- The fall in production meant that the UK became a net importer of petroleum products in 2013 for the first time since 1984, the year of the miner's strike. Product exports decreased by 3 per cent and imports increased by 9 per cent on 2012 to meet the shortfall (Table 3.2, Chart 3.4).
- The UK's demand for petroleum products is not aligned with refinery production. Whilst transport accounted for over two thirds of the UK's total 66 million tonnes demand, refinery production is short of demand for jet fuel and diesel (respectively meeting 41 per cent and 68 per cent of demand) but long on motor spirit (140 per cent of demand) (Table 3.2, Chart 3.5).

Introduction

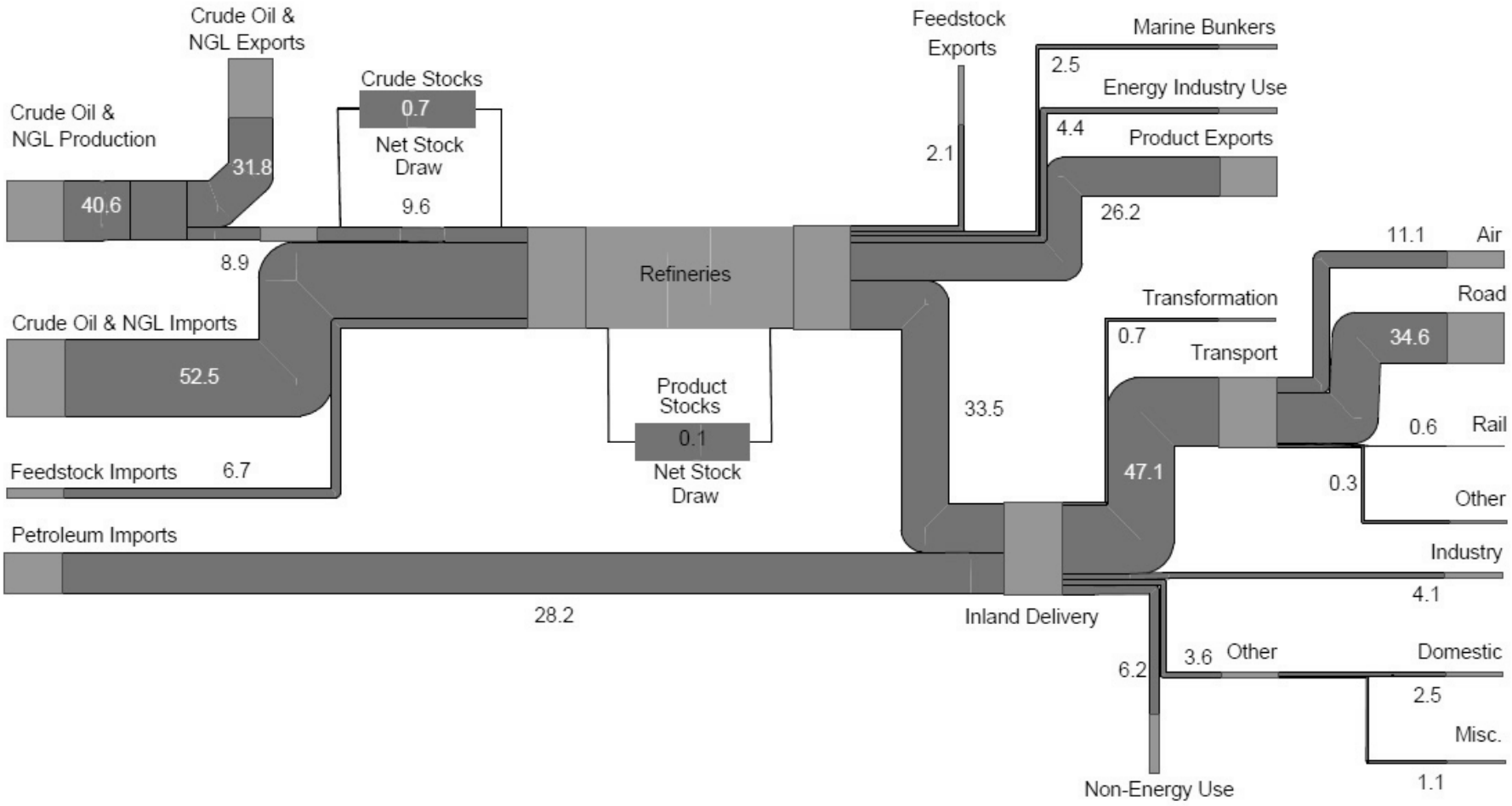
3.1 This chapter covers the supply and demand of primary oils and petroleum products. The first part of the chapter covers the supply and demand of primary oils, crude oils and Natural Gas Liquids (NGLs), and feedstocks. The second part of the chapter covers the supply and demand of petroleum products.

3.2 The supply and demand of primary oils and petroleum products are shown as commodity balances at the end of the chapter, in Tables 3.1 and 3.2 to 3.4 respectively. Additional tables show information on refinery capacity, as well as additional detail on deliveries into consumption.

3.3 In addition to the information in this chapter, there is considerable data on DECC's website. 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. These tables are only available in the internet version of this publication which can be found on the DECC's website at www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes.

3.4 A flow chart of the movement of crude oil, other refinery feedstocks and petroleum products for 2013 is provided, showing the flow from indigenous production and imports to eventual uses. The flows are measured in million tonnes and the widths of the bands are approximately proportional to the size of the flow they represent.

Petroleum Flow Chart 2013 (million tonnes)



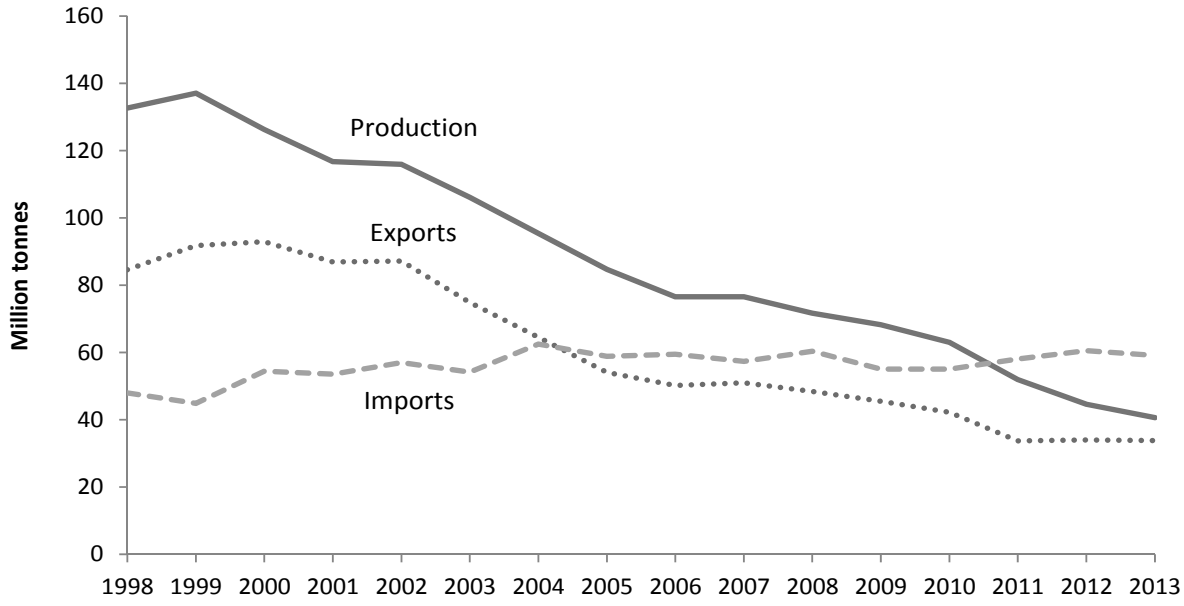
Note:
This flow chart is based on the data that appear in Tables 3.1 and 3.2.
The numbers on either side of the flow chart will not match due to losses in transformation.
Biofuels are not included.

Supply and demand for primary oil (Table 3.1)

3.5 Table 3.1 shows details of the production, supply and disposals of primary oils (crude oil, NGLs and feedstocks) in 2011, 2012 and 2013. The table examines the supply chain from the production of primary oils recorded by individual oil terminals and oil fields, to their disposal either to UK refineries or to export. It also covers the use of these primary oils as recorded by the refineries.

3.6 The chart below summarises the main trends since 1998. Production from the United Kingdom Continental Shelf (UKCS) peaked in 1999 and has been in decline since.

Chart 3.1: Production, imports and exports of primary oils 1998 to 2013



3.7 Production of primary oils in 2013, at 40.6 million tonnes, showed an 8.8 per cent reduction on 2012 and is now just under thirty per cent of 1999 peak oil production. On average, year-on-year primary oil production has been decreasing by around 8 per cent a year since 1999 but higher unplanned maintenance in 2011 saw a record reduction of 17 per cent which was then followed by a reduction of 14 per cent in 2012. The rate of reduction in 2013 is more in line with the average of the last 15 years.

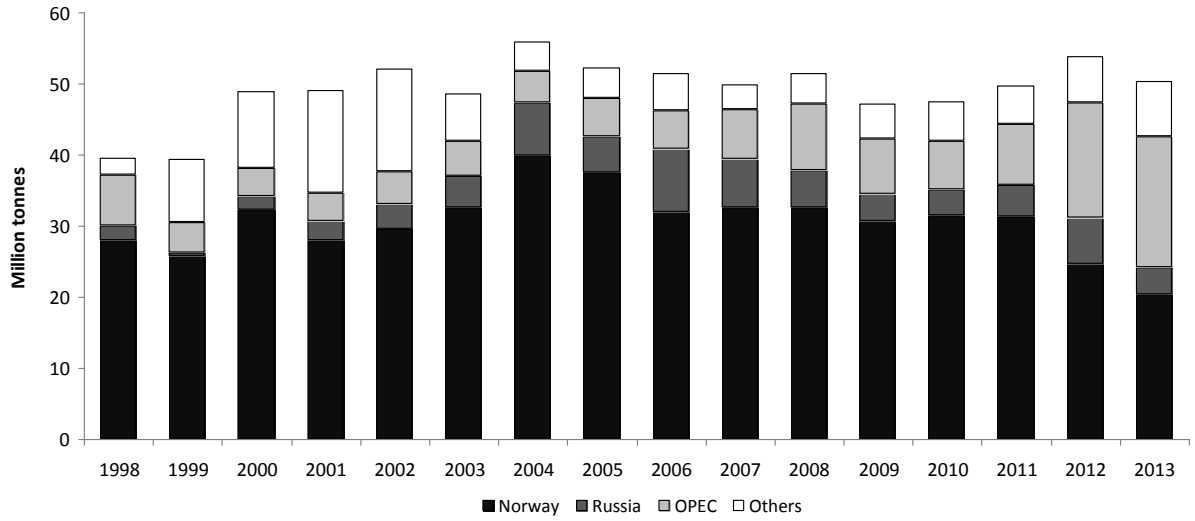
3.8 DECC's Energy Development Unit publishes data on field-by-field production. These are available three months in arrears owing to the need to protect commercially sensitive data. These data can be accessed at www.gov.uk/oil-and-gas-uk-field-data.

3.9 Whilst the UK is a net importer of crude oils, North Sea production remains significant. Figures for 2013 are not fully available but in 2012 the UK produced more crude oil than any other country in the European Union (EU), and the second most in the European Economic Area after Norway.

3.10 Whilst the UK's production of crude oil and NGLs would be sufficient to meet nearly two thirds of refinery demand, there is an active trade in oil which leads to significant volumes of oil being imported and exported to meet global and UK demand. Further declines in exports and increases in imports will be seen as indigenous production continues to decline - 2011 was the first year where imports exceeded production and the trend continued in both 2012 and 2013. Despite this, primary oil continues to make a significant contribution to the UK economy.

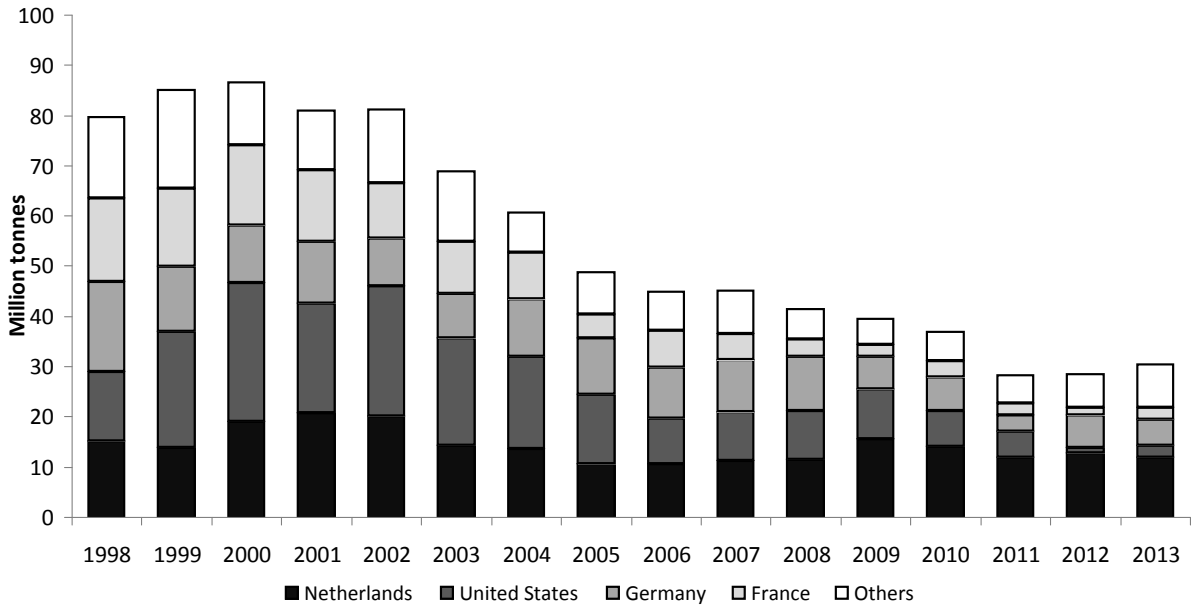
3.11 The sources of crude oil imports from other countries are shown in Chart 3.2. The principal source of the UK's imports has consistently been Norway, historically accounting for around 65 per cent of all imports given not only its proximity to the UK but also the similarity in its crude types. The proportion of crude oil sourced from Norway decreased to 40 per cent in 2013, with imports from OPEC countries, in particular Algeria (12 per cent) and Saudi Arabia (4 per cent) increasing significantly. Imports from Canada and Equatorial Guinea have also increased.

Chart 3.2: Source of UK oil imports 1998 to 2013



3.12 Chart 3.3 shows crude oil exports increased slightly in 2012 and 2013. However, crude oil exports are still substantially lower than their peak of 87 million tonnes in 2000. Exports decreased sharply between 2002 and 2005 and were at a relatively steady level until a large decrease in 2011, exports in 2013 were still some way short of those in 2010. Crude oil is principally exported to the Netherlands, Germany, France and historically the US. In 2013, 39 per cent of all crude oil exports were destined for the Netherlands and 17 per cent to Germany. While exports to the US and France increased in 2013, they have generally decreased over recent years and account for only 7 per cent and 8 per cent of exports respectively.

Chart 3.3: Destination of UK oil exports 1998 to 2013



UK refineries

3.13 A significant proportion of the UK's primary oil is processed into petroleum products at the UK's seven refineries. Data for refinery capacity as at the end of 2013 are presented in table 3A, with the location of these refineries illustrated in Map 3A.

3.14 Refinery capacity in 2013 was at a similar level to 2012 though there has been a slight reduction as some refiners have taken off line some processing capacity. Since 2009, two refiners have ceased operation in the UK (the Petroplus Teeside refinery in 2009, and the Petroplus Coryton refinery in 2012).

Map 3A: Distribution of UK refineries active as at end 2013

Symbols relate to refinery details given in Table 3A. White circles denote petrochemical refinery operations.

Table 3A: UK refinery processing capacity as at end 2013

Million tonnes per annum

(Symbols relate to Map 3A)		**Distillation**	**Reforming**	**Cracking and Conversion**
❶	Stanlow – Essar Energy PLC	11.6	1.5	4.0
❷	Fawley – ExxonMobil Co. Ltd	13.1	4.4	5.0
❸	Grangemouth – Ineos Refining Ltd	9.0	1.7	3.3
❹	Lindsey Oil Refinery Ltd – Total (UK)	10.1	1.4	3.8
❺	Pembroke – Valero Energy Ltd	10.1	1.8	6.1
❻	Killingholme – Phillips 66 UK	11.9	2.6	10.7
❼	Milford Haven - Murco Pet. Ltd	6.5	1.5	2.0
①	Harwich – Petrochem Carless Ltd	0.4	-	-
②	Eastham – Eastham Refinery Ltd	1.2	-	-
③	Dundee (Camperdown) – Nynas UK AB	0.7	-	-
Total all refineries		**74.6**	**14.9**	**34.9**

Supply and demand for petroleum products (Tables 3.2 to 3.4)

3.15 These tables show details of the production, supply and disposal of petroleum products into the UK market in 2011, 2012 and 2013.

3.16 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 (ships engaged in travel to an overseas destination).

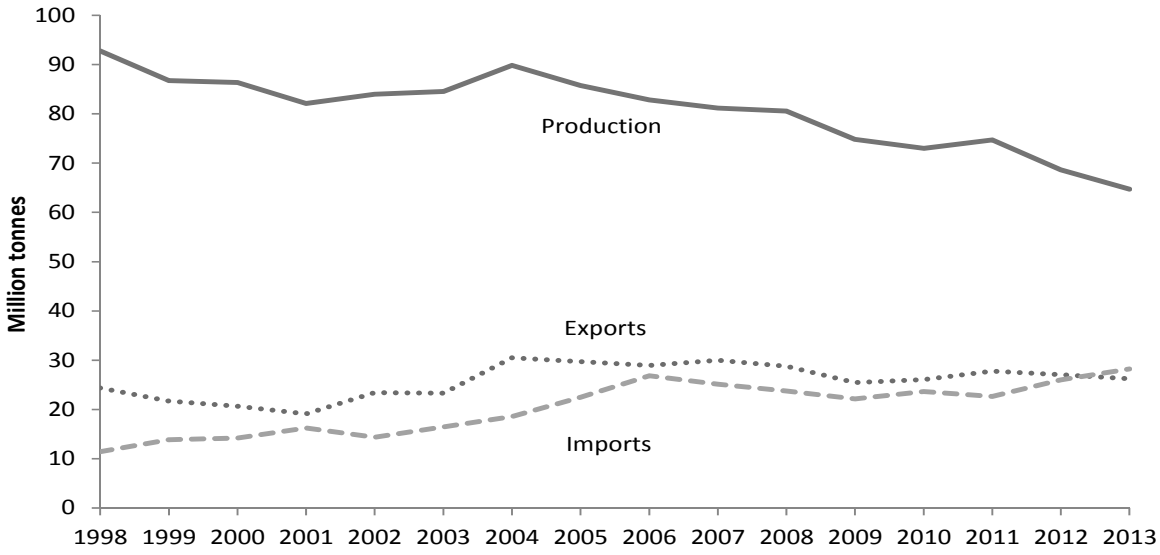
3.17 The lower half of the table reports the demand side and covers the uses made of the different products, including the uses made within refineries of fuels in the refining process, and details of the amounts reported by oil companies within the UK as delivered for final consumption.

Supply of petroleum products

3.18 Chart 3.4 below shows the production output of petroleum products since 1998. In 2013, the UK's refineries produced 64.7 million tonnes of product, down 6 per cent on last year but down 25 per cent on 2000. Production loss from the closure of Coryton in 2012 has not been made up by other refineries and several disruptions occurred throughout 2013, most notably the temporary closure of Grangemouth in October. However, the UK's refinery capacity remains substantial with only Germany and Italy having significantly greater capacity than the UK.

3.19 In 2013 the UK became a net importer of petroleum products for the first time since 1984 when industrial action in the coal industry led to greater imports of petroleum for power generation. Production has been in decline for some time but the UK had remained a net exporter of petroleum in almost every year since 1974. In 2013 exports decreased by 3 per cent but imports increased by 9 per cent. On balance the UK imported 2 million tonnes more than it exported.

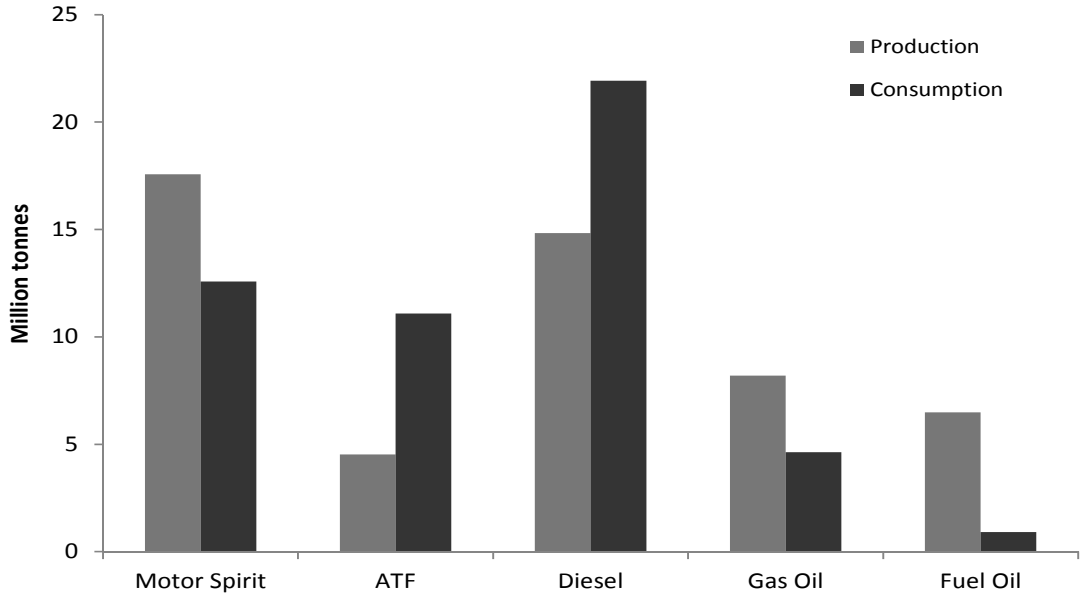
Chart 3.4: Production, imports and exports of petroleum products 1998 to 2013



3.20 Whilst UK refinery output is roughly level with domestic demand, demand and supply is not matched on a product by product basis. The UK's refineries – in common with many other European countries – are geared to produce motor spirit for domestic cars and fuel oil for electricity generation. With the increasing dieselisation of the UK's car fleet, and the switch from fuel oil to other fuels for electricity generation, UK domestic production of individual petroleum products is no longer aligned with the domestic market demand. To balance demand the UK trades widely and is one of the largest importers of aviation turbine fuel (ATF) in the OECD and one of the largest exporters of Motor Spirit.

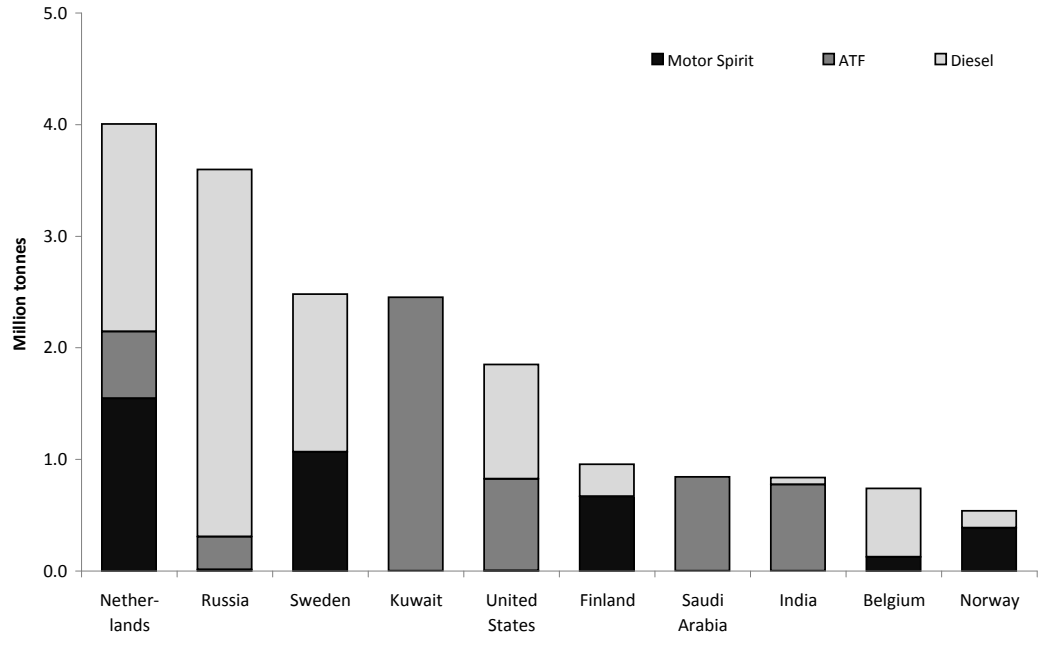
3.21 Chart 3.5 shows production and consumption figures for the key petroleum products, and illustrates the deficit for ATF and diesel road fuel (DERV), and the surpluses for motor spirit, gas oil, and fuel oil.

Chart 3.5: Production and consumption of key petroleum products 2013



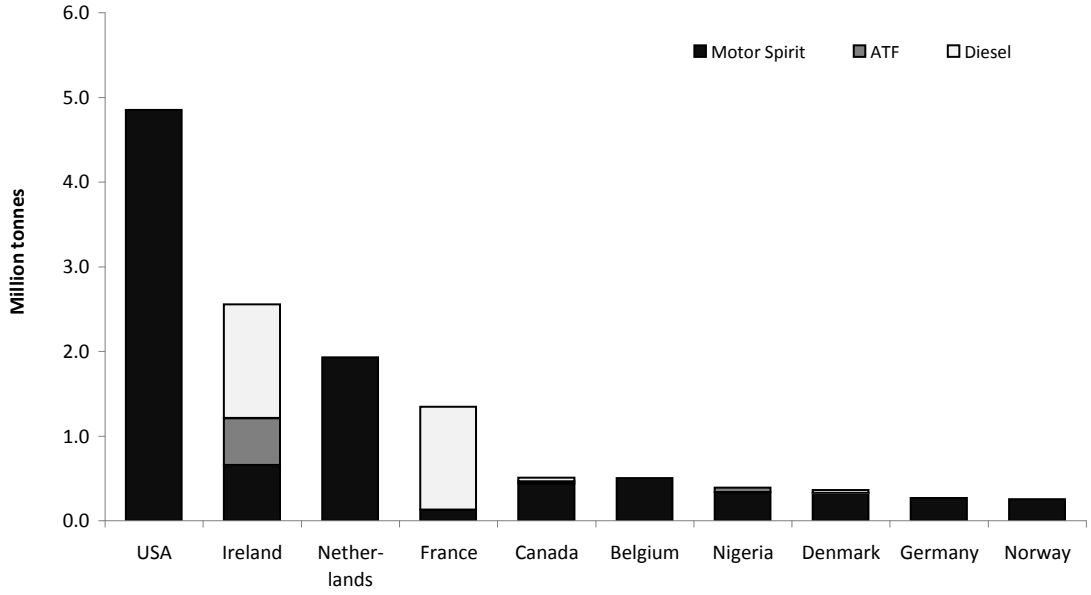
3.22 Chart 3.6 shows the source of transport fuels imported by the UK in 2013. The ten countries shown account for more than 80 per cent of the total volume of imports. Historically the bulk of the products have come via the Netherlands, which acts as a major trading hub (the fuel might have originated from elsewhere in Europe or beyond). This was the case in 2013 although Sweden was the biggest source of imports in 2012. The diversity of supply is increasing as demand for key transport fuels increases. The chart shows that there is a clear split between imports from European countries (which are mainly transport diesel) and imports from Asia (where the bulk of aviation fuel is sourced from generally more modern refinery operations than seen in Europe). These trade data are provisional and subject to change.

Chart 3.6: Source of transport fuel imports 2013



3.23 Similarly, chart 3.7 shows the exports by country for the three principal transport fuels in 2013. The chart covers 92 per cent of these exports. A considerable portion of the UK's total exports (35 per cent) is motor spirit exported to the United States. Ireland imports a substantial volume of its products from the UK as it has no indigenous production of aviation fuel.

Chart 3.7: Destination of transport fuel exports 2013

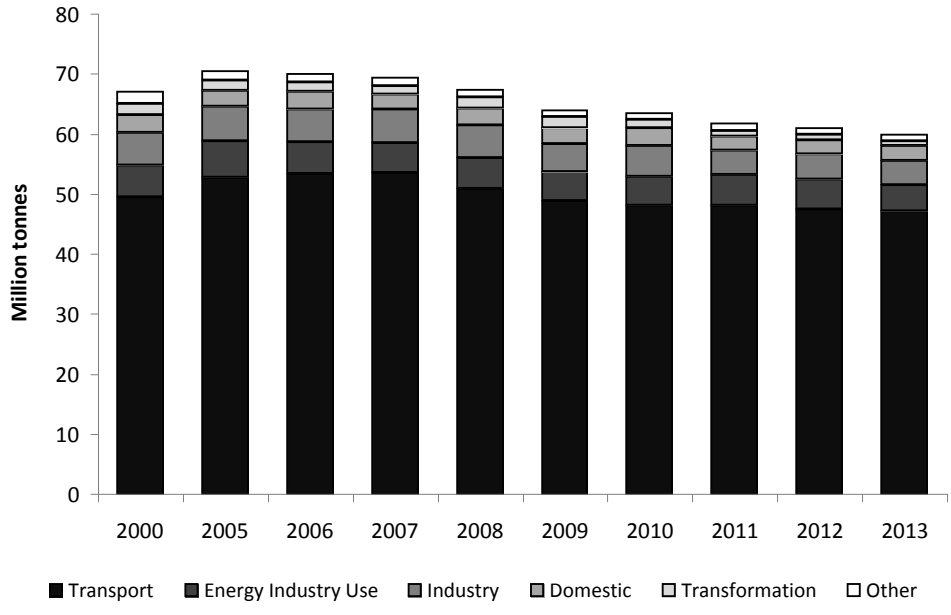


3.24 For 2008 to 2013 data, DECC have revised the volume of fuel and gas oil that are consumed by international bunkers. This has resulted in an uplift in the estimates of national navigation of approximately 500kt, with a corresponding decrease in the figures for international shipping. Further details are given in paragraphs 3.65 and 3.66, and in the June 2014 edition of Energy trends: www.gov.uk/government/publications/energy-trends-june-2014-special-feature-articles-changes-to-oil-demand-data.

Consumption of petroleum products

3.25 Tables 3.2 to 3.4 show the consumption of oil products during the period 2011 to 2013, by consumers and products. The chart below shows that the principal use for petroleum products is consistently for transport, consuming around 70 per cent of total demand in 2013.

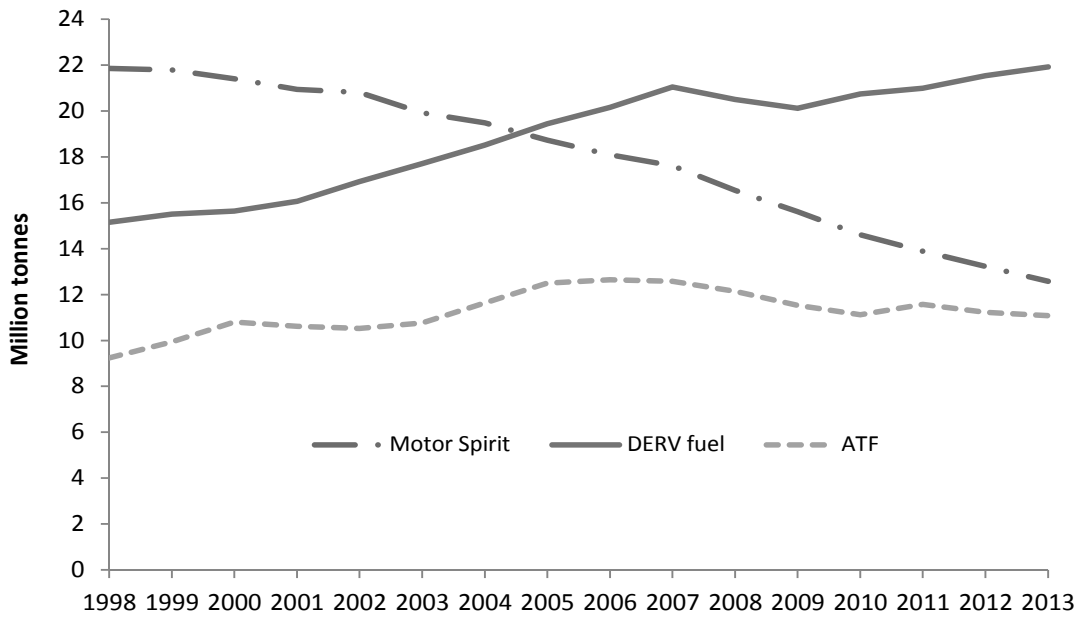
Chart 3.8: Petroleum products used for energy (share by main sector)



3.26 The three main transport fuels - aviation turbine fuel, motor spirit and diesel road fuel – account for over two-thirds of the UK's total demand of petroleum products. A very small proportion of oil – less than 1 per cent – is used for electricity generation with the remainder being used for refinery fuel and non-energy use.

3.27 Whilst the proportion of petroleum delivered to transport has remained relatively constant over time, the mix of fuels has changed greatly. The chart below shows that deliveries of motor spirit have decreased by an average of 4 per cent year-on-year since 2000. However, deliveries of DERV have increased by nearly 3 per cent year-on-year (with a downturn in deliveries during the recession) over the same period.

Chart 3.9: Motor Spirit, DERV and ATF fuel deliveries 1998 to 2013



3.28 The increase in diesel sales reflects in part the changing pattern of fuel consumption within the UK. The table below, derived from information provided by Ricardo-AEA, shows that the share of DERV fuel being consumed by cars and taxis almost doubled between 1995 and 2013.

Table 3B: Estimated consumption of road transport fuels by vehicle class

	1995	2000	2005	2010	2013
Motor spirit:					
Cars and taxis	93%	95%	97%	97%	97%
Light goods vehicles	7%	4%	2%	2%	2%
Motor cycles etc	1%	1%	1%	1%	1%
DERV:					
Cars and taxis	19%	25%	31%	34%	37%
Light goods vehicles	15%	21%	22%	21%	22%
Heavy goods vehicles	58%	46%	40%	36%	36%
Buses and coaches	8%	8%	8%	7%	6%

Source: Ricardo-AEA. Percentages exclude off road use of DERV.

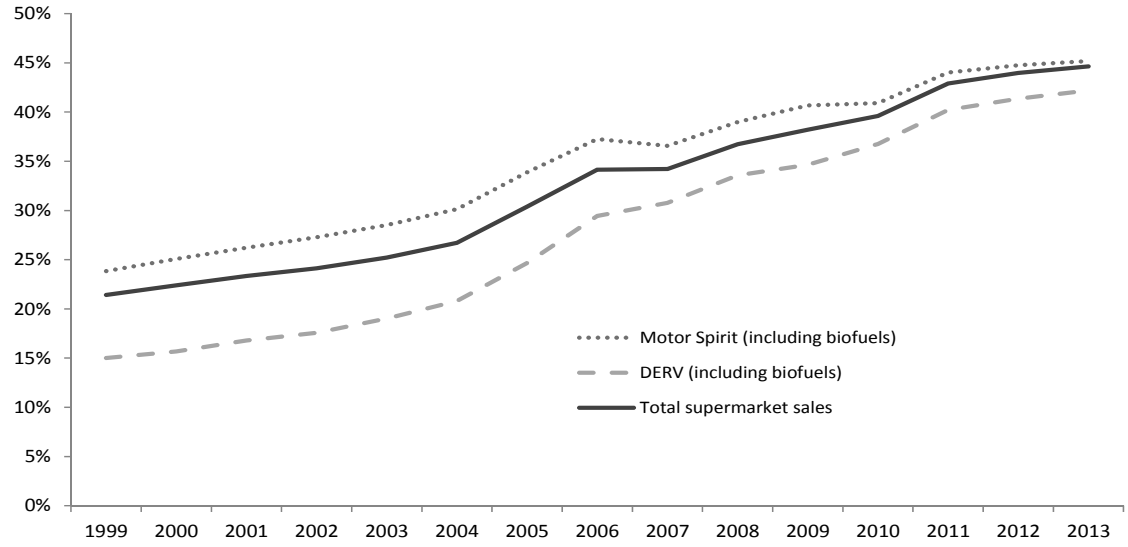
3.29 ATF deliveries increased around 20 per cent between 1998 and 2013, but remain 12 per cent down on the 2006 peak. Demand in recent years has been consistent, being between 11 and 11.5 million tonnes each year. Despite robust passenger numbers post the economic downturn, increased efficiencies in the air-line industry have meant that less fuel has been needed.

Consumption of transport fuels (Table 3.6)

3.30 Table 3.6 provides details of the consumption of motor spirit, gas oil/diesel and fuel oils for the period 2009 to 2013. The table includes information on retail, supermarket and commercial sales of motor spirit and DERV fuel that are of interest but cannot be accommodated within the commodity balances. Following consultation with industry, we have made a number of changes to the way that the supermarket data is collected and published from this edition of DUKES onwards.

3.31 Volumes of motor spirit and DERV sold by supermarkets are in line with last year's figures. Chart 3.10 shows sales by supermarkets have taken a slightly larger share of retail deliveries (i.e. deliveries to final consumers) of motor spirit and DERV fuel since 2006, and accounted for 45 per cent and 42 per cent respectively in 2013.

Chart 3.10: Percentage of road fuels sold by supermarkets 1999 to 2013



Biofuels in transport

3.32 The quantity of biofuels blended into motor spirit and DERV are shown in Table 3.6 of this chapter. Total consumption of biofuels and road fuels are shown in Table 3C, this is based on the volume of fuel for which excise duty has been paid to HM Revenue and Customs (HMRC). As a percentage of road fuels, biofuels have increased significantly since 2003, and now represent 3.5 per cent of total road fuels; consumption had dipped in 2012 but has recovered to the level seen in 2011. Further details on biofuel consumption can be found in Chapter 6, paragraph 6.36. Biofuels are also included in the overall energy balances in Chapter 1.

Table 3C: Consumption of Biodiesel and Bioethanol in the UK 2003 to 2013

Unit: Million litres

Year	Biodiesel	All diesel including biodiesel	Biodiesel as % diesel share	Bioethanol	All motor spirit including bioethanol	Bioethanol as % motor spirit share	Biofuels as % of road fuels
2003	19	20,906	0.1%	0	27,393	0.0%	0.0%
2004	21	22,181	0.1%	0	27,025	0.0%	0.0%
2005	33	23,233	0.1%	85	25,693	0.3%	0.2%
2006	169	24,286	0.7%	95	24,724	0.4%	0.5%
2007	347	25,501	1.4%	153	24,019	0.6%	1.0%
2008	886	25,686	3.4%	206	22,709	0.9%	2.3%
2009	1,044	25,089	4.2%	320	22,029	1.5%	2.9%
2010	1,049	25,773	4.1%	631	20,650	3.1%	3.6%
2011	925	25,926	3.6%	652	19,548	3.3%	3.5%
2012	634	26,348	2.4%	775	18,792	4.1%	3.1%
2013	766	26,969	2.8%	820	18,020	4.6%	3.5%

Source: HM Revenue and Customs

Stocks of oil (Table 3.7)

3.33 The UK holds stocks of oil to help reduce the adverse impact on the UK and the global economy of any disruptions of supplies of oil arising from domestic or international incidents. The UK is required to hold these stocks under EU and IEA qualifying arrangements.

3.34 The EU requires the UK to hold stocks equivalent to 61 days of consumption (having excluded 10 per cent of stocks for tank bottoms). This requirement applies to the consumption of the three main transport fuels, gas oil, burning oil and fuel oil only.

3.35 The International Energy Agency (IEA) requires the UK to hold stocks equivalent to 90 days of imports (having excluded 10 per cent of stocks for tank bottoms). This requirement applies to all upstream oil and downstream petroleum products.

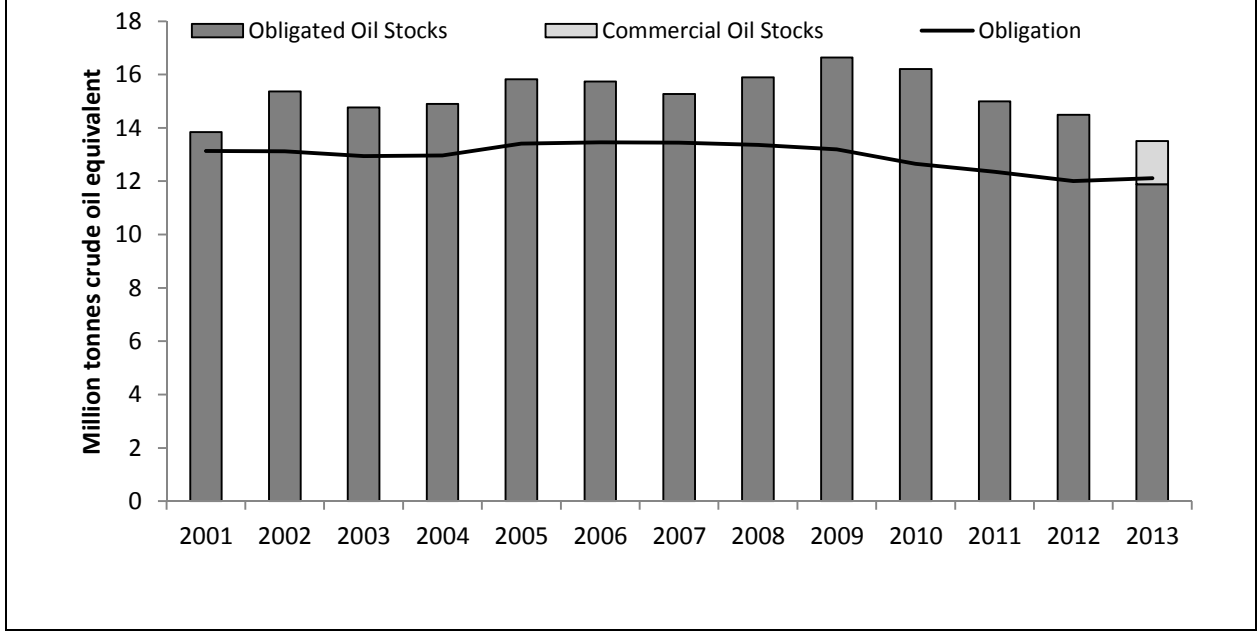
3.36 As the UK is still a major producer of crude oil, the EU obligation is currently larger than the IEA obligation.

3.37 To meet these obligations, the UK Government requires companies supplying significant volume of obligated oil products (greater than 50 thousand tonnes) into the UK market to maintain emergency stocks of oil. These obligations are calculated based on each company's supplies to market.

3.38 As part of meeting their obligation, oil companies are allowed to hold international stocks in other EU countries. Prior to 2013, these arrangements could only be made with Member States with which the UK had a formal bilateral agreement. The introduction of a new EC Directive, which came into effect at the beginning of 2013, led to a relaxation of these rules. This allowed EU Member States to hold stocks in other EU Member States without the requirement of a formal bilateral agreement. At the end of 2012, the UK could hold stocks in six other EU Member States but by the end of 2013, the UK had in place arrangements to hold stocks in fifteen other Member States.

3.39 The impact of changes to the EC Directive related to international stocks can be seen in 2013, where stocks of crude and feedstocks held abroad increased more than seven-fold (see Chart 3.11). The stock figures in Table 3.7 take account of these international stocks to give an overall picture of the amount of stocks available to the UK.

Chart 3.11: UK Oil stocks 2001 to 2013

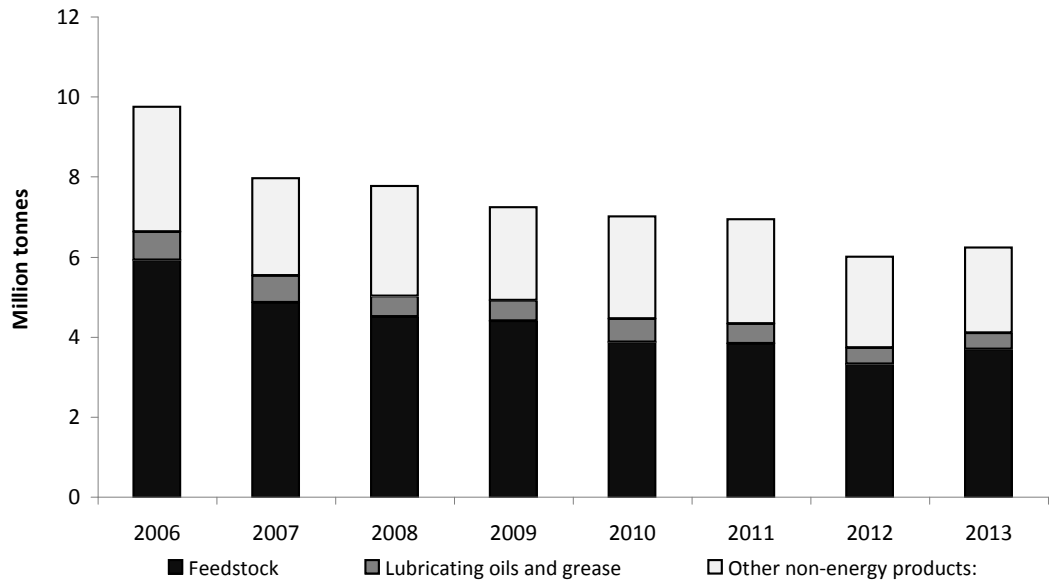


3.40 Stocks of all upstream and downstream petroleum products were 4.8 per cent (0.75 million tonnes) higher at the end of 2013 versus 2012. At the end of 2013, UK companies held stocks equal to around 76 days of consumption.

Inland deliveries for non-energy uses (Table 3.8)

3.41 Table 3.8 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. The chart below shows the principal use of non-energy products since 2006.

Chart 3.12: Use of non-energy products 2006 to 2013



3.42 We have made a number of changes to the split between energy and non-energy use for 2008 - 2013. In particular, we have reduced the volume of petroleum coke delivered into non-energy use and have also decreased our estimate of the volumes of butane, naphtha and gas oil delivered into non-energy use. The estimates make improved use of data on trade and data from DECC's refinery survey. An article highlighting these changes in more detail is available in the June 2014 edition of Energy trends: www.gov.uk/government/publications/energy-trends-june-2014-special-feature-articles-changes-to-oil-demand-data.

3.43 The principal products for non-energy use are gases used as feedstocks in petrochemical plants. Natural gas liquids used as feedstocks accounted for over 40 per cent of the fuel put to non-energy use in 2013. Bitumen for road surfacing (over 20 per cent of non-energy use) and naphtha (around 15 per cent) are the other most significant fuels.

Technical notes and definitions

3.44 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1.

Indigenous production

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

Deliveries

3.46 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 UK (e.g. aviation fuels).

Sources of data

3.47 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, supermarket shares) or with the use of additional data (such as trade data from HM Revenue and Customs (HMRC) to cover import activity by non-reporting companies). In addition to these data sources, DECC make use of the Emissions data from the EU's Emissions Trading Scheme provided on major energy users. In particular ensuring the consistency of data published on fuel used within the refineries (refinery gases and petroleum coke) and the sectoral usage of Gas oil and Fuel oil.

Statistical differences

3.48 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.

3.49 The statistical differences headings listed in the primary oil commodity balances (Table 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.

3.50 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.

3.51 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 Natural Gas Liquids (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.

3.52 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.

3.53 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.

3.54 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.

3.55 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.

3.56 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.).

3.57 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 3D below illustrates this.

Table 3D 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

3.58 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.

3.59 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.

3.60 There is scope for error in the recording of these two components of transfers. 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.

3.61 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

3.62 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 HMRC that are given in Annex G on DECC's energy statistics website. 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.

3.63 We are currently undertaking a review of trade data which could result in changes to these data.

Marine bunkers

3.64 This covers deliveries to ocean going and coastal vessels under international bunker contracts. Other deliveries to fishing, coastal and inland vessels are excluded. As part of DECC's audit programme, UK refinery contacts reviewed the provision of fuel to marine bunkers in 2009. Whilst a number of companies have reviewed their methodology there are still issues with determining the final destination of fuel when these are supplied to third parties that are not part of DECC's monitoring programme. This issue impacts on both the volumes delivered directly to marine vessels, and whether those vessels are engaged in domestic or international navigation.

3.65 Whilst DECC will continue to work closely with reporting companies to improve the estimation of marine fuel use, for 2008 - 2013, we have fully aligned energy demand for shipping in line with the estimates of marine fuel use in the UK's National Atmospheric Emissions Inventory (NAEI). The NAEI figures use DECC's estimate of marine fuels and derive the split between international and domestic use based on an activity based study of the UK's marine fuel use.

Crude and process oils

3.66 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

3.67 Refineries distil 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)

3.68 The following paragraphs define the product headings used in the text and tables of this chapter. The products are used for energy, 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 (C3H8), gaseous at normal temperature but generally stored and transported under pressure as a liquid. Used mainly for industrial purposes but also as transport Liquid Petroleum Gas (LPG), and some domestic heating and cooking.

Butane - Hydrocarbon containing four carbon atoms (C4H10), 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 °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. agricultural vehicles, fishing vessels, construction equipment used off road and usually coloured with a red marker dye). Gas oil used for oil and gas extraction is included from 2005 onwards.

(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)

3.69 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°C and 400°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°C to 200°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°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, but all inland deliveries of lubricating oils have been classified as non-energy use only. Some deliveries are used for energy purposes, but it is difficult to estimate energy use figures with any degree of accuracy, hence no such estimates appear in the commodity balance tables. DUKES Table 3.8 (prior to 2010, table 3D, within the main text) provides limited information on the use of lubricants and grease. The information which was published under the heading of “Motors” has been amended to now include “Gear Oils and Transmission” to give a full picture of the lubricants used by vehicles.

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 as it has a higher energy content than coal, though a lower energy content than fuel oils.

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

Main classes of consumer

3.70 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 section, as opposed to other uses of refinery fuels that are recorded in the Energy Industry Use section. From the 2009 chapter of the Digest, data in Chapter 3 (Table 3.2 to 3.4) has been aligned with Chapter 5 (Table 5.4). The data on oil used for electricity generation collected from major power producers and autogenerators is judged to be at least as accurate as the data from refiners on deliveries, and has the advantage of consistency. These data have been revised back to 2005.

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 1G of Chapter 1, excluding Iron and Steel.

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 National Atmospheric Emissions Inventory (NAEI).

Air transport - Total inland deliveries of aviation turbine fuel and aviation spirit. The figures cover deliveries of aviation fuels in the UK to international and other airlines, British and foreign Governments (including armed services) and for private flying. In order to compile the NAEI, 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 5 per cent of aviation turbine fuel use is for domestic consumption. A further 5 per cent is estimated to be consumed by the military.

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

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

3.71 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 website, at: www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics.

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3.1 Commodity balances 2011 - 2013[(1)]

Primary oil

Thousand tonnes

	Crude oil	Ethane	Propane	Butane	Condensate	Total NGL	Feedstock	Total primary oil
2011								
Supply								
Production	48,571	599	1,047	768	987	3,401	-	51,972
Imports	49,649	243	338	214	511	1,305	7,139	58,092
Exports	-28,286	-7	-634	-348	-561	-1,550	-3,908	-33,745
Stock change (2)	+533	..	..	..	..	+10	+67	+611
Transfers (3)	-	-834	-747	-268	-292	-2,141	+19	-2,122
Total supply	**70,467**	..	..	..	..	**1,025**	**3,317**	**74,809**
Statistical difference (4)(5)	-224	..	..	..	..	-19	-27	-271
Total demand (5)	**70,691**	..	..	..	..	**1,044**	**3,345**	**75,080**
Transformation (Petroleum refineries)	70,691	..	..	..	..	1,044	3,345	75,080
Energy industry use	-	-	-	-	-	-	-	-
2012								
Supply								
Production	42,052	422	759	566	761	2,508	-	44,561
Imports	53,763	367	463	307	440	1,577	5,218	60,559
Exports	-28,535	-6	-697	-339	-363	-1,404	-4,021	-33,961
Stock change (2)	-587	..	..	..	..	-40	+141	-486
Transfers (3)	-	-783	-486	-254	-360	-1,882	-53	-1,934
Total supply	**66,694**	..	..	..	..	**759**	**1,285**	**68,738**
Statistical difference (4)(5)	-117	..	..	..	..	+9	-16	-124
Total demand (5)	**66,811**	..	..	..	..	**750**	**1,301**	**68,862**
Transformation (Petroleum refineries)	66,811	..	..	..	..	750	1,301	68,862
Energy industry use	-	-	-	-	-	-	-	-
2013								
Supply								
Production	38,456	341	683	542	624	2,190	-	40,646
Imports	50,311	515	582	396	666	2,158	6,667	59,137
Exports	-30,376	-14	-610	-421	-333	-1,378	-2,089	-33,844
Stock change (2)	+615	..	..	..	..	+19	+90	+724
Transfers (3)	-	-843	-632	-290	-371	-2,136	+463	-1,674
Total supply	**59,007**	..	..	..	..	**853**	**5,130**	**64,990**
Statistical difference (4)(5)	-20	..	..	..	..	-16	-8	-44
Total demand (5)	**59,026**	..	..	..	..	**870**	**5,137**	**65,034**
Transformation (Petroleum refineries)	59,026	..	..	..	..	870	5,137	65,034
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) Transfers direct from the source to the petrochemical sector.

(4) Total supply minus total demand.

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

3.2 Commodity balances 2013

Petroleum products

Thousand tonnes

	Ethane	Propane	Butane	Other gases	Naphtha	Aviation spirit	Motor spirit	White Spirit & SBP	Aviation turbine fuel
Supply									
Production	-	1,474	852	2,454	1,587	-	17,572	106	4,527
Other sources	843	632	290	-	371	-	-	-	-
Imports	-	309	105	-	1,013	15	4,511	220	8,077
Exports	-	-597	-568	-	-738	-	-10,213	-49	-970
Marine bunkers	-	-	-	-	-	-	-	-	-
Stock change *(2)*	-	14	-3	0	93	1	-356	-10	-20
Transfers	-	-	-	23	-1,181	-0	1,060	12	-535
Total supply	**843**	**1,833**	**675**	**2,477**	**1,144**	**16**	**12,574**	**278**	**11,080**
Statistical difference *(3)*	**-**	**3**	**-40**	**0**	**4**	**0**	**0**	**-1**	**-3**
Total demand	**843**	**1,830**	**715**	**2,477**	**1,140**	**16**	**12,574**	**279**	**11,083**
Transformation	**-**	**7**	**-**	**201**	**-**	**-**	**-**	**-**	**-**
Electricity generation	-	-	-	201	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	201	-	-	-	-	-
Heat generation	-	7	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Energy industry use	**-**	**-**	**-**	**2,133**	**-**	**-**	**-**	**-**	**-**
Electricity generation	-	-	-	-	-	-	-	-	-
Oil & gas extraction	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	2,133	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Losses	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Final consumption	**843**	**1,823**	**715**	**143**	**1,140**	**16**	**12,574**	**279**	**11,083**
Industry	**-**	**211**	**66**	**-**	**218**	**-**	**-**	**-**	**-**
Unclassified	-	210	66	-	218	-	-	-	-
Iron & steel	-	1	-	-	-	-	-	-	-
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	**-**	**94**	**-**	**-**	**-**	**16**	**12,574**	**-**	**11,083**
Air	-	-	-	-	-	16	-	-	11,083
Rail	-	-	-	-	-	-	-	-	-
Road	-	94	-	-	-	-	12,574	-	-
National navigation	-	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-	-
Other	**-**	**374**	**28**	**-**	**-**	**-**	**-**	**-**	**-**
Domestic	-	272	28	-	-	-	-	-	-
Public administration	-	-	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-	-	-
Agriculture	-	102	0	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-	-
Non energy use *(4)*	**843**	**1,145**	**621**	**143**	**922**	**-**	**-**	**279**	**-**

(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 3.42 to 3.44.

3.2 Commodity balances 2013 (continued)

Petroleum products

Thousand tonnes

Burning oil	DERV	Gas Oil [1]	Fuel oils	Lubri -cants	Bitu -men	Petroleum coke	Misc. products	Total Products	
									Supply
2,705	14,831	8,193	6,483	377	777	1,773	1,017	64,728	Production
-	-	-	-	-	-	-	-	2,136	Other sources
637	10,145	589	626	405	648	758	187	28,245	Imports
-381	-2,843	-3,310	-4,586	-395	-75	-578	-919	-26,223	Exports
-	-	-1,248	-1,292	-	-	-	-	-2,540	Marine bunkers
52	46	91	93	47	-1	78	-19	106	Stock change *(2)*
463	-253	250	-401	-22	13	-	107	-463	Transfers
3,477	**21,926**	**4,566**	**922**	**413**	**1,361**	**2,031**	**373**	**65,990**	**Total supply**
16	**0**	**-66**	**9**	**-5**	**2**	**0**	**-46**	**-124**	**Statistical difference *(3)***
3,460	**21,926**	**4,631**	**913**	**418**	**1,358**	**2,031**	**420**	**66,114**	**Total demand**
-	**-**	**105**	**252**	**-**	**-**	**162**	**-**	**726**	**Transformation**
-	-	100	199	-	-	51	-	551	Electricity generation
-	-	42	158	-	-	51	-	251	Major power producers
-	-	58	41	-	-	-	-	299	Autogenerators
-	-	5	53	-	-	-	-	65	Heat generation
-	-	-	-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	111	-	111	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Other
-	**-**	**619**	**331**	**-**	**-**	**1,245**	**58**	**4,387**	**Energy industry use**
-	-	-	-	-	-	-	-	-	Electricity generation
-	-	619	-	-	-	-	-	619	Oil & gas extraction
-	-	-	331	-	-	1,245	58	3,768	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	-	-	-	Other
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**Losses**
3,460	**21,926**	**3,907**	**330**	**418**	**1,358**	**624**	**361**	**61,000**	**Final Consumption**
1,400	**-**	**1,520**	**150**	**-**	**-**	**497**	**-**	**4,063**	**Industry**
1,376	-	901	15	-	-	497	-	3,284	Unclassified
-	-	0	3	-	-	-	-	4	Iron & steel
-	-	-	-	-	-	-	-	-	Non-ferrous metals
-	-	145	5	-	-	-	-	150	Mineral products
-	-	75	21	-	-	-	-	96	Chemicals
-	-	-	-	-	-	-	-	-	Mechanical engineering etc
-	-	1	-	-	-	-	-	1	Electrical engineering etc
24	-	132	5	-	-	-	-	161	Vehicles
-	-	32	96	-	-	-	-	128	Food, beverages etc
-	-	40	-	-	-	-	-	40	Textiles, leather, etc
-	-	27	-	-	-	-	-	27	Paper, printing etc
-	-	29	-	-	-	-	-	29	Other industries
-	-	139	5	-	-	-	-	144	Construction
-	**21,926**	**1,323**	**89**	**-**	**-**	**-**	**-**	**47,104**	**Transport**
-	-	-	-	-	-	-	-	11,099	Air
-	-	645	-	-	-	-	-	645	Rail
-	21,926	-	-	-	-	-	-	34,593	Road
-	-	678	89	-	-	-	-	767	National navigation
-	-	-	-	-	-	-		-	Pipelines
2,060	**-**	**1,050**	**90**	**-**	**-**	**-**	**-**	**3,602**	**Other**
2,060	-	129	-	-	-	-	-	2,489	Domestic
-	-	249	19	-	-	-	-	268	Public administration
-	-	311	47	-	-	-	-	358	Commercial
-	-	146	14	-	-	-	-	262	Agriculture
-	-	215	10	-	-	-	-	225	Miscellaneous
-	**-**	**14**	**-**	**418**	**1,358**	**127**	**361**	**6,231**	**Non energy use *(4)***

3.3 Commodity balances 2012

Petroleum products

Thousand tonnes

	Ethane	Propane	Butane	Other gases	Naphtha	Aviation spirit	Motor spirit	White Spirit & SBP	Aviation turbine fuel
Supply									
Production	-	1,573	939	2,632	1,488r	-	17,013r	72	5,775
Other sources	783	486	254	-	360	-	-	-	-
Imports	-	207	86	-	672r	19	4,184	172	7,127
Exports	-	-506	-641	-	-917	-	-8,561	-25	-1,320
Marine bunkers	-	-	-	-	-	-	-	-	-
Stock change *(2)*	-	-4	13	0	35	-2	26	-1	96
Transfers	-	-	0	23	-588r	-0	560r	-0	-479
Total supply	**783**	**1,756**	**650**	**2,655**	**1,049r**	**17**	**13,222r**	**218**	**11,199**
Statistical difference *(3)*	**-**	**7r**	**-7**	**0**	**-11r**	**-0**	**-8**	**-1**	**-22**
Total demand	**783**	**1,749r**	**657**	**2,655**	**1,060r**	**17**	**13,231**	**219**	**11,221**
Transformation	**-**	**18r**	**-**	**191r**	**-**	**-**	**-**	**-**	**-**
Electricity generation	-	-	-	191r	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	191r	-	-	-	-	-
Heat generation	-	18r	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Energy industry use	**-**	**-**	**-**	**2,348r**	**-**	**-**	**-**	**-**	**-**
Electricity generation	-	-	-	-	-	-	-	-	-
Oil & gas extraction	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	2,348r	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Losses	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Final consumption	**783**	**1,731r**	**657**	**116**	**1,060r**	**17**	**13,231**	**219**	**11,221**
Industry	**-**	**277r**	**102r**	**-**	**162r**	**-**	**-**	**-**	**-**
Unclassified	-	275r	102	-	162r	-	-	-	-
Iron & steel	-	2	0	-	-	-	-	-	-
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	**-**	**93**	**-**	**-**	**-**	**17**	**13,231**	**-**	**11,221**
Air	-	-	-	-	-	17	-	-	11,221
Rail	-	-	-	-	-	-	-	-	-
Road	-	93	-	-	-	-	13,231	-	-
National navigation	-	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-	-
Other	**-**	**378**	**27**	**-**	**-**	**-**	**-**	**-**	**-**
Domestic	-	270	27	-	-	-	-	-	-
Public administration	-	-	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-	-	-
Agriculture	-	108	0	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-	-
Non energy use *(4)*	**783**	**983r**	**528r**	**116**	**898r**	**-**	**-**	**219**	**-**

(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 3.42 to 3.44.

3.3 Commodity balances 2012 (continued)

Petroleum products

Thousand tonnes

Burning oil	DERV	Gas Oil [1]	Fuel oils	Lubri -cants	Bitu -men	Petroleum coke	Misc. products	Total Products	
									Supply
2,268	15,772	8,941	7,164	457	1,222	2,072	1,252	68,640r	Production
-	-	-	-	-	-	-	-	1,882	Other sources
702	9,541	1,186	660	443	225	624	178	26,028r	Imports
-112	-3,377	-4,270	-5,300	-479	-151	-582	-841	-27,083	Exports
-	-	-1,123r	-1,540r	-	-	-	-	-2,663r	Marine bunkers
40	-133	7	90	-11	-11	-22	6	128	Stock change *(2)*
446	-268	217	-14	-0	63	173	-78	53	Transfers
3,343	**21,535**	**4,958r**	**1,059r**	**410**	**1,348**	**2,264**	**518**	**66,985r**	**Total supply**
14	**-3**	**-33r**	**8**	**-3**	**-6**	**3**	**-24**	**-85r**	**Statistical difference *(3)***
3,329	**21,538**	**4,990r**	**1,052r**	**412**	**1,355**	**2,261**	**541**	**67,070r**	**Total demand**
-	**-**	**60**	**390r**	**-**	**-**	**194r**	**-**	**853r**	**Transformation**
-	-	54r	337r	-	-	111	-	694r	Electricity generation
-	-	41	261	-	-	111	-	413	Major power producers
-	-	13r	76r	-	-	-	-	281r	Autogenerators
-	-	5	52r	-	-	-	-	76r	Heat generation
-	-	-	-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	83r	-	83r	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Other
-	**-**	**617r**	**346r**	**-**	**-**	**1,606**	**-**	**4,916r**	**Energy industry use**
-	-	-	-	-	-	-	-	-	Electricity generation
-	-	617r	-	-	-	-	-	617r	Oil & gas extraction
-	-	-	346r	-	-	1,606	-	4,299r	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	-	-	-	Other
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**Losses**
3,329	**21,538**	**4,313r**	**316r**	**412**	**1,355**	**461r**	**541**	**61,300r**	**Final Consumption**
1,332	**-**	**1,878r**	**122r**	**-**	**-**	**308r**	**-**	**4,182r**	**Industry**
1,332	-	1,219r	7r	-	-	308r	-	3,406r	Unclassified
-	-	0	2	-	-	-	-	5	Iron & steel
-	-	-	-	-	-	-	-	-	Non-ferrous metals
-	-	151r	3r	-	-	-	-	154r	Mineral products
-	-	96r	17r	-	-	-	-	114r	Chemicals
-	-	-	-	-	-	-	-	-	Mechanical engineering etc
-	-	2	-	-	-	-	-	2	Electrical engineering etc
-	-	132r	3r	-	-	-	-	134r	Vehicles
-	-	33r	87r	-	-	-	-	120r	Food, beverages etc
-	-	42r	-	-	-	-	-	42r	Textiles, leather, etc
-	-	26r	-	-	-	-	-	26r	Paper, printing etc
-	-	37r	-	-	-	-	-	37r	Other industries
-	-	140r	3r	-	-	-	-	143r	Construction
-	**21,538**	**1,326r**	**89r**	**-**	**-**	**-**	**-**	**47,515r**	**Transport**
-	-	-	-	-	-	-	-	11,238	Air
-	-	643r	-	-	-	-	-	643r	Rail
-	21,538	-	-	-	-	-	-	34,861	Road
-	-	683r	89r	-	-	-	-	772r	National navigation
-	-	-	-	-	-	-	-	-	Pipelines
1,996	**-**	**1,093**	**105**	**-**	**-**	**-**	**-**	**3,599**	**Other**
1,996	-	140	-	-	-	-	-	2,433	Domestic
-	-	259	36	-	-	-	-	295	Public administration
-	-	319	43	-	-	-	-	362	Commercial
-	-	151	14	-	-	-	-	273	Agriculture
-	-	224	12	-	-	-	-	236	Miscellaneous
-	**-**	**15r**	**0**	**412**	**1,355**	**154r**	**541**	**6,004r**	**Non energy use *(4)***

3.4 Commodity balances 2011

Petroleum products

Thousand tonnes

	Ethane	Propane	Butane	Other gases	Naphtha	Aviation spirit	Motor spirit	White Spirit & SBP	Aviation turbine fuel
Supply									
Production	-	1,645	953	3,018	1,493	-	19,856	65	6,411
Other sources	834	747	268	-	292	-	-	-	-
Imports	-	158	31	-	459	20	3,259	97	6,881
Exports	-	-545	-276	-	-1,102	-	-9,363	-20	-1,210
Marine bunkers	-	-	-	-	-	-	-	-	-
Stock change *(2)*	-	-4	-7	-	30	1	39	1	-28
Transfers	-	-	28	24	-125	-	91	-1	-491
Total supply	**834**	**2,001**	**997**	**3,042**	**1,046**	**21**	**13,881**	**143**	**11,562**
Statistical difference *(3)*	**-**	**7**	**3**	**0**	**-0**	**0**	**-13**	**-0**	**-11**
Total demand	**834**	**1,994**	**994**	**3,042**	**1,046**	**21**	**13,895**	**143**	**11,574**
Transformation	**-**	**13**	**-**	**289**	**-**	**-**	**-**	**-**	**-**
Electricity generation	-	-	-	289	-	-	-	-	-
Major power producers	-	-	-	-	-	-	-	-	-
Autogenerators	-	-	-	289	-	-	-	-	-
Heat generation	-	13	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Energy industry use	**-**	**-**	**-**	**2,584**	**-**	**-**	**-**	**-**	**-**
Electricity generation	-	-	-	-	-	-	-	-	-
Oil & gas extraction	-	-	-	-	-	-	-	-	-
Petroleum refineries	-	-	-	2,584	-	-	-	-	-
Coal extraction	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Losses	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Final consumption	**834**	**1,981**	**994**	**169**	**1,046**	**21**	**13,895**	**143**	**11,574**
Industry	**-**	**311r**	**328r**	**-**	**92r**	**-**	**-**	**-**	**-**
Unclassified	-	311r	328r	-	92r	-	-	-	-
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	**-**	**98**	**-**	**-**	**-**	**21**	**13,895**	**-**	**11,574**
Air	-	-	-	-	-	21	-	-	11,574
Rail	-	-	-	-	-	-	-	-	-
Road	-	98	-	-	-	-	13,895	-	-
National navigation	-	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-	-
Other	**-**	**360**	**27**	**-**	**-**	**-**	**-**	**-**	**-**
Domestic	-	259	26	-	-	-	-	-	-
Public administration	-	-	-	-	-	-	-	-	-
Commercial	-	-	-	-	-	-	-	-	-
Agriculture	-	101	0	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-	-
Non energy use *(4)*	**834**	**1,212r**	**640r**	**169**	**954r**	**-**	**-**	**143**	**-**

(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 3.42 to 3.44.

3.4 Commodity balances 2011 (continued)

Petroleum products

Thousand tonnes

Burning oil	DERV	Gas Oil [1]	Fuel oils	Lubri -cants	Bitu -men	Petroleum coke	Misc. products	Total Products	
									Supply
2,377	16,801	8,683	7,907	430	1,476	2,180	1,412	74,707	Production
-	-	-	-	-	-	-	-	2,141	Other sources
618	7,736	1,245	808	508	206	496	134	22,656	Imports
-173	-3,127	-4,667	-5,140	-487	-151	-652	-887	-27,800	Exports
-	-	-990r	-2,139r	-	-	-	-	-3,130r	Marine bunkers
-2	83	43	-15	48	4	-16	12	188	Stock change *(2)*
441	-498	444	-12	2	96	55	-73	-19	Transfers
3,260	**20,994**	**4,757r**	**1,410r**	**502**	**1,630**	**2,064**	**598**	**68,743r**	**Total supply**
-28	**3**	**-1**	**-5**	**10**	**10**	**0**	**6**	**-20**	**Statistical difference *(3)***
3,288	**20,991**	**4,759r**	**1,415r**	**491**	**1,621**	**2,064**	**592**	**68,763r**	**Total demand**
-	**-**	**63**	**380**	**-**	**-**	**139r**	**-**	**883r**	**Transformation**
-	-	57	328	-	-	48	-	722	Electricity generation
-	-	38	256	-	-	48	-	342	Major power producers
-	-	19	72	-	-	-	-	380	Autogenerators
-	-	6	52	-	-	-	-	71	Heat generation
-	-	-	-	-	-	-	-	-	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	91r	-	91r	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Other
-	**-**	**533**	**476**	**-**	**-**	**1,526**	**-**	**5,119**	**Energy industry use**
-	-	-	-	-	-	-	-	-	Electricity generation
-	-	533	-	-	-	-	-	533	Oil & gas extraction
-	-	-	476	-	-	1,526	-	4,586	Petroleum refineries
-	-	-	-	-	-	-	-	-	Coal extraction
-	-	-	-	-	-	-	-	-	Coke manufacture
-	-	-	-	-	-	-	-	-	Blast furnaces
-	-	-	-	-	-	-	-	-	Patent fuel manufacture
-	-	-	-	-	-	-	-	-	Pumped storage
-	-	-	-	-	-	-	-	-	Other
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**Losses**
3,288	**20,991**	**4,163r**	**559r**	**491**	**1,621**	**399r**	**592**	**62,761r**	**Final Consumption**
1,314	**-**	**1,633r**	**295r**	**-**	**-**	**137r**	**-**	**4,111r**	**Industry**
1,314	-	1,027r	64r	-	-	137r	-	3,274r	Unclassified
-	-	-	4	-	-	-	-	4	Iron & steel
-	-	-	-	-	-	-	-	-	Non-ferrous metals
-	-	146r	19r	-	-	-	-	165r	Mineral products
-	-	93	86	-	-	-	-	179	Chemicals
-	-	0r	0r	-	-	-	-	1r	Mechanical engineering etc
-	-	0r	0r	-	-	-	-	0r	Electrical engineering etc
-	-	113r	15r	-	-	-	-	127r	Vehicles
-	-	44r	90r	-	-	-	-	135r	Food, beverages etc
-	-	45r	-	-	-	-	-	45r	Textiles, leather, etc
-	-	28r	-	-	-	-	-	28r	Paper, printing etc
-	-	8	0	-	-	-	-	8	Other industries
-	-	128r	17r	-	-	-	-	145r	Construction
-	**20,991**	**1,368r**	**99r**	**-**	**-**	**-**	**-**	**48,045r**	**Transport**
-	-	-	-	-	-	-	-	11,594	Air
-	-	638	-	-	-	-	-	638	Rail
-	20,991	-	-	-	-	-	-	34,984	Road
-	-	730r	99r	-	-	-	-	829r	National navigation
-	-	-	-	-	-	-	-	-	Pipelines
1,973	**-**	**1,128**	**165**	**-**	**-**	**-**	**-**	**3,654**	**Other**
1,973	-	142	-	-	-	-	-	2,401	Domestic
-	-	273	68	-	-	-	-	340	Public administration
-	-	341	61	-	-	-	-	402	Commercial
-	-	153	16	-	-	-	-	271	Agriculture
-	-	219	21	-	-	-	-	240	Miscellaneous
-	**-**	**34r**	**-**	**491**	**1,621**	**262r**	**592**	**6,952r**	**Non energy use *(4)***

3.5 Supply and disposal of petroleum[(1)]

Thousand tonnes

	2009	2010	2011	2012	2013
Primary oils (Crude oil, NGLs and feedstocks)					
Indigenous production *(2)*	68,199	62,962	51,972	44,561	40,646
Imports	55,056	55,064	58,092	60,559	59,137
Exports *(3)*	-45,444	-42,196	-33,745	-33,961	-33,844
Transfers - Transfers to products *(4)*	-2,618	-2,306	-2,141	-1,882	-2,136
Product rebrands (5)	+16	+71	+19	-53	+463
Stock change *(6)*	+545	-39	+611	-486	+724
Use during production *(7)*	-	-	-	-	-
Calculated refinery throughput *(8)*	75,754	73,555	74,809	68,738	64,990
Overall statistical difference *(9)*	150	12	-271	-124	-44
Actual refinery throughput	**75,604**	**73,543**	**75,080**	**68,862**	**65,034**
Petroleum products					
Losses in refining process *(10)*	777	566	373	222r	305
Refinery gross production *(11)*	74,828	72,977	74,707	68,640r	64,728
Transfers - Transfers to products *(4)*	2,618	2,306	2,141	1,882	2,136
Product rebrands *(5)*	-16	-71	-19	53	-463
Imports	22,172	23,665	22,656	26,028r	28,245
Exports *(12)*	-25,491	-26,065	-27,800	-27,083	-26,223
Marine bunkers	-3,306r	-2,807r	-3,130r	-2,663r	-2,540
Stock changes *(6)* - Refineries	421	568	162r	102r	79
Power generators	-101	+26	+26r	+26r	+26
Calculated total supply	71,125r	70,599r	68,743r	66,985r	65,990
Statistical difference *(9)*	-127r	17r	-20	-85r	-124
Total demand *(4)*	**71,252r**	**70,582r**	**68,763r**	**67,070r**	**66,114**
Of which:					
Energy use	64,011r	63,566r	61,812r	61,065r	59,883
Of which, for electricity generation *(13)*	1,563	1,144r	722	694r	551
total refinery fuels *(13)*	4,304	4,378	4,585	4,299r	3,768
Non-energy use	7,241r	7,016r	6,952r	6,004r	6,231

(1) Aggregate monthly data on oil production, trade, refinery throughput and inland deliveries are available - see paragraph 3.72 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 and used as feedstock 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.

3.6 Additional information on inland deliveries of selected products[(1)]

Thousand Tonnes

	2009	2010	2011	2012	2013
Motor spirit					
of which, Hydrocarbon *(2)*	15,613	14,602	13,895	13,231	12,574
of which, Bio-ethanol *(3)*	235	460	479	569	602
Total Motor Spirit including Bio-ethanol	**15,848**	**15,062**	**14,374**	**13,800**	**13,176**
of which, sold through Supermarkets (4)	6,455	6,179	6,345	6,196	5,974
of which, sold through Refiners, and other traders *(5)*	9,392	8,883	8,029	7,604	7,202
of which, sold via commercial sales *(6)*	-	-	-	-	-
Diesel Road Fuel	-	-	-	-	-
Hydrocarbon *(7)*	20,112	20,740	20,991	21,538	21,926
Bio-diesel (8)	874	880	777	531	645
Total Diesel Road Fuel including Bio-diesel	**20,986**	**21,620**	**21,767**	**22,069**	**22,570**
of which, sold through Supermarkets (4)	4,769	5,115	5,722	5,959	6,217
of which, sold through Refiners, and other traders *(5)*	8,942	8,747	8,454	8,413	8,482
of which, sold via commercial sales *(6)*	7,275	7,758	7,591	7,696	7,871
Other gas diesel oil (9)	**5,034**	**5,059**	**4,759**	**4,990**	**4,631**
Aviation Fuels	-	-	-	-	-
Total Sales - Aviation fuels	**11,555**	**11,137**	**11,594**	**11,238**	**11,099**
Aviation spirit	22	21	21	17	16
Aviation turbine fuel	11,533	11,116	11,574	11,221	11,083
Fuel Oil	-	-	-	-	-
Total Sales - Fuel Oils	**1,516**	**1,371**	**939**	**707**	**581**
Light	275	511	449	367	229
Medium	161	112	106	118	139
Heavy	1,080	749	384	221	213

(1) Monthly data for inland deliveries of oil products are available -
See DECC website: www.gov.uk/government/organisations/department-of-energy-climate-change/series/oil-statistics.
(2) Demand excluding bioethanol. Based on HMRC duty data.
(3) Bioethanol based on HMRC duty data, excluding other renewables.
(4) Sales by supermarkets are collected by a monthly reporting system. Includes Asda, Morrisons, Sainsburys and Tesco only.
(5) Total sales excluding supermarket and commercial sales.
(6) Commercial sales are currently estimated based on road movements and a number of assumptions. Further details are available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/295224/Supermarket_share_of_retail_sales.pdf.
(7) Demand excluding biodiesel. Based on HMRC duty data.
(8) Biodiesel based on HMRC duty data, excluding other renewables.
(9) This includes gas diesel oil used for other purposes such as heating and middle distillate feedstock destined for use in the petrochemical industry.

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

Thousand tonnes

	2009	2010	2011	2012	2013
Crude and process oils					
Refineries *(2)*	3,848	4,110	3,889	3,829	3,592
Terminals *(3)*	1,136	1,049	694	1,194	1,102
Offshore *(4)*	682	520	540	473	513
Net bilateral stocks *(5)*	367	210	151	195	1,469
Total crude and process oils *(6)*	**6,033**	**5,889**	**5,274**	**5,690**	**6,677**
Petroleum products					
Ethane	-	-	-	-	-
Propane	30	18	23	28	19
Butane	39	31	38	25	29
Other petroleum gases	-	-	-	-	-
Naphtha	209	229	199	165	112
Aviation spirit	6	4	3	5	4
Motor spirit	1,150	1,140	846	727	1,287
White spirit & SBP	9	9	7	9	18
Aviation turbine fuel	1,429	1,188	1,216	1,229	1,162
Burning oil	204	209	238	198	287
Gas/Diesel oil (7)(8)	4,623	4,018	3,776	4,230	2,482
of which, DERV	633	641	545	677	1,662
Fuel oils *(9)*	797	687	645	514	1,340
Lubricating oils	149	180	132	143	186
Bitumen	134	101	95	106	127
Petroleum wax	8	8	6	4	10
Petroleum coke	288	236	252	274	236
Miscellaneous products	96	104	92	88	228
Total all products	**9,173**	**8,164**	**7,569**	**7,743**	**7,528**
Of which : net bilateral stocks *(5)*	2,728	2,563	2,100	2,441	2,432

(1) Aggregate monthly data on the level of stocks of crude oil and oil products are available - see paragraph 3.72 and Annex C.
(2) Stocks of crude oil, NGLs and process oils at UK refineries.
(3) Stocks of crude oil and NGLs at UKCS (UK continental shelf) pipeline terminals.
(4) Stocks of crude oil in tanks and partially loaded tankers at offshore fields.
(5) The difference between stocks held abroad for UK use under approved bilateral agreements and the equivalent stocks held in the UK for foreign use.
(6) Includes process oils held abroad for UK use approved by bilateral agreements.
(7) Includes marine diesel oil.
(8) The increase in gas oil stocks and the decrease in fuel oil stocks can be attributed to the change in patterns of stocks held abroad, under bilateral agreements, by UK companies as part of their national stocking obligation.

3.8 Additional information on inland deliveries for non-energy uses[(1)(2)]

Thousand tonnes

	2009	2010	2011	2012	2013
Feedstock for petroleum chemical plants:					
Propane	1,177r	1,141r	1,212r	983r	1,145
Butane	844r	628r	640r	528r	621
Other gases	1344	1199	1003	899	986
Total gases	3,365r	2,968r	2,855r	2,410r	2,751
Naphtha (LDF)	977r	881r	954r	898r	922
Middle Distillate Feedstock (MDF)	52r	21r	34r	15r	14
Other products	-	-	-	-	
Total feedstock	4,395r	3,869r	3,843r	3,323r	3,687
Lubricating oils and grease:					
Aviation	3	4	4	3	3
Industrial	296	337	276	205	211
Marine	17	19	17	15	15
Other motors, Gear oils & Transmissions	191	216	191	186	186
Agricultural	3	4	3	3	3
Fuel oil sold as lubricant	-	-	-	-	-
Total lubricating oils and grease	510	580	491	412	418
Other non-energy products:					
Industrial spirit/white spirit	174	224	143	219	279
Bitumen	1,381	1,370	1,621	1,355	1,358
Petroleum coke	207r	301r	262r	154r	127
Miscellaneous products	573	671	592	541	361
Total other non-energy products	2,336r	2,566r	2,618r	2,268r	2,126
Total non-energy use	**7,241r**	**7,016r**	**6,952r**	**6,004r**	**6,231**

(1) Aggregate monthly data on the total non energy use of oil products are available - see paragraph 3.72 and Annex C.
(2) For further details on non-energy usage see paragraphs 3.42 to 3.44

Chapter 4
Natural gas

Key points

- UK natural gas production has been decreasing since production peaked in 2000, and in 2013 was down 6 per cent on 2012 to 424 TWh. This reflects the continuing long-term decline in UK natural gas production, which has fallen by an average of 8 per cent per year since 2000.
- Imports fell by 3 per cent in 2013 versus 2012; exports fell by 24 per cent. Net imports were 5 per cent higher in 2013 compared to 2012 (Table 4.1).
- Imports of Liquefied Natural Gas (LNG) continued to fall from their record 275 TWh in 2011 to 103 TWh in 2013, due to increased demand from Asia. Pipeline imports were up by 8 per cent in 2013, driven primarily by increased imports from Belgium and Norway in 2013. These increases were primarily due to the completion of scheduled maintenance on these pipelines.
- Total gas demand (natural gas plus colliery methane) decreased by 1 per cent in 2013 to 851 TWh. This small drop reflects the larger reduction seen in gas used for electricity generation and by the energy industry being mostly offset by an increase in gas demand by industry and other final users.

Introduction

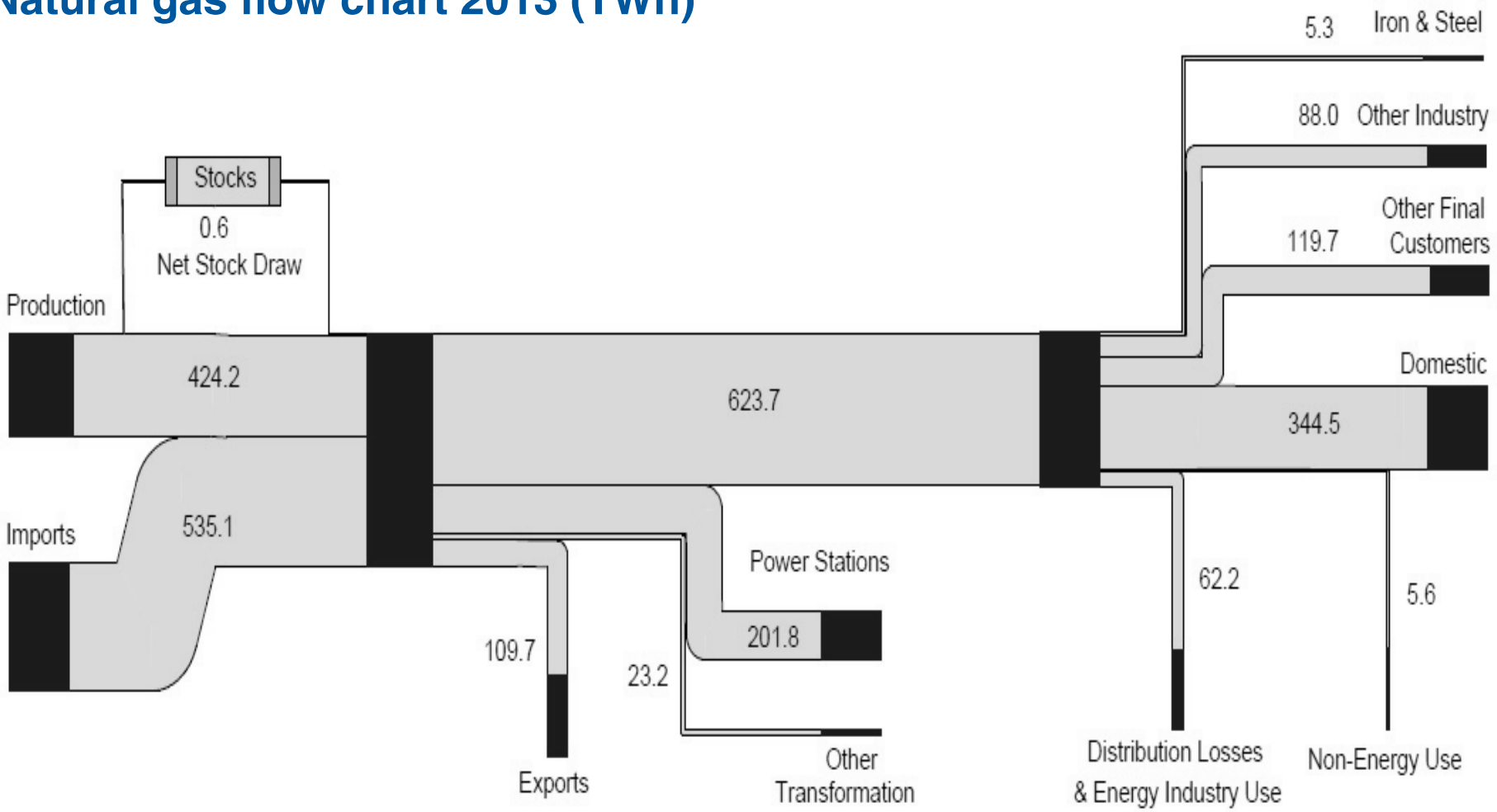
4.1 This chapter presents six data tables on the production, transmission and consumption of natural gas and colliery methane, and two maps showing flows of gas in and around Europe and the gas transmission system in the UK (pages 97 & 101).

4.2 An energy flow chart for 2013, 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 tables. It illustrates the flow of gas from the point at which it becomes available from indigenous 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.

4.3 Table 4.1 shows the commodity balances for natural gas and colliery methane, both separately and in aggregate. In Table 4.2, the two gases are aggregated and presented as a five year time-series, showing supply, transmission and consumption. The natural gas statistics include bio-methane gas which is currently being produced by a small number of companies to feed into the national grid. At this stage volumes are small, but as this increases we will look to present these in a separate column in Table 4.1. 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 and Table 4.6 shows LNG imports by terminal. 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.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes.

4.4 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 6. Details of net selling values of gas for the domestic, industrial and other sectors are to be found in Chapter 1.

Natural gas flow chart 2013 (TWh)



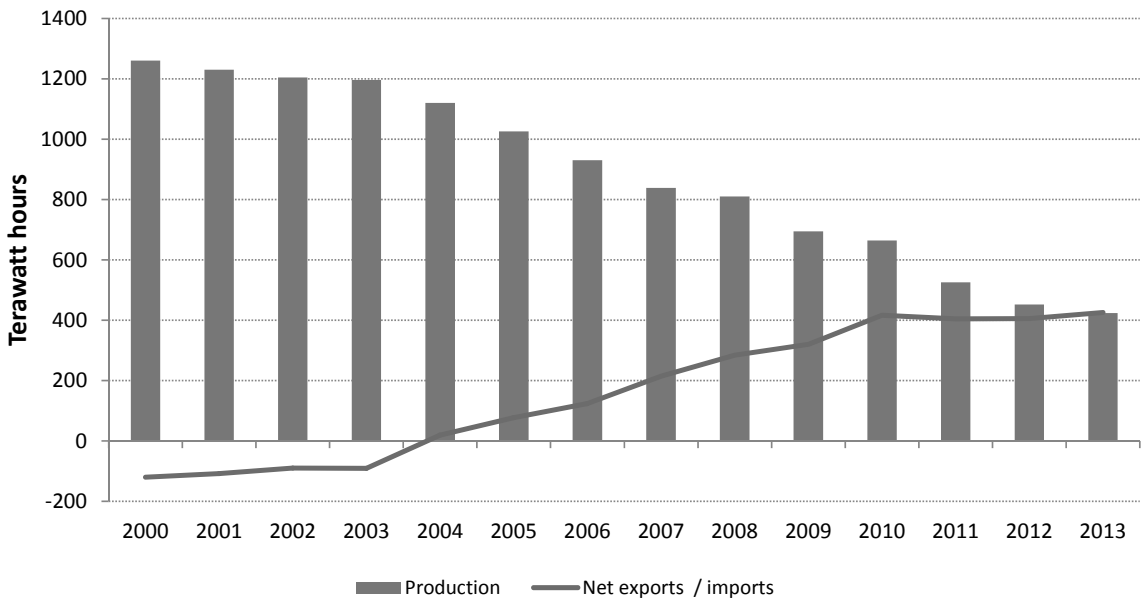
Notes:
This flow chart is based on the data that appear in Table 4.1, excluding colliery methane.

Commodity balances for gas (Tables 4.1 and 4.2)

4.5 UK Continental Shelf (UKCS) production of natural gas has been in decline since the turn of the millennium. Since 2000, gas production has fallen off at a rate of 8 per cent per year. However, the rate of decline over the past 13 years has varied; there were large year-on-year falls in production in 2011 and 2012 (20.8 and 14.1 per cent respectively). In 2013 the rate of decline lessened, to 6.2 per cent lower than in 2012. UK production in 2013 (at 424 TWh) was only 34 per cent of the level produced in 2000 (1,260 TWh). Despite this the UK, along with the Netherlands, remains one of the two major gas-producing nations within the EU. In 2013, the UK's indigenous production was sufficient to meet half of the UK's demand.

4.6 The UK imports natural gas by pipeline from Norway, Belgium and the Netherlands and LNG by ship. The UK has been a net importer of gas since 2004, with net imports of gas in 2013 accounting for 50 per cent of supply. The UK imported 535 TWh in 2013. In 2009 two new LNG terminals at Milford Haven (Dragon and South Hook) opened and contributed to the 32.8 per cent increase in natural gas imports between 2010 and 2011. LNG imports declined from the 2011 peak and, by 2013, were 103TWh; this is 63 per cent lower than in 2011. The decline in LNG imports reflects the increased price of LNG, driven by increased demand elsewhere (particularly in Japan, which continues to move away from nuclear energy), and the increase in pipeline imports into the UK from Belgium and Norway in 2013. The increase in pipeline imports reflects the completion of scheduled maintenance on the Interconnector between Belgium and the UK (completed during June 2013) along with completion of maintenance on the Langeled pipeline and Easington terminal.

Chart 4.1: Natural gas production and net exports/imports 2000 to 2013

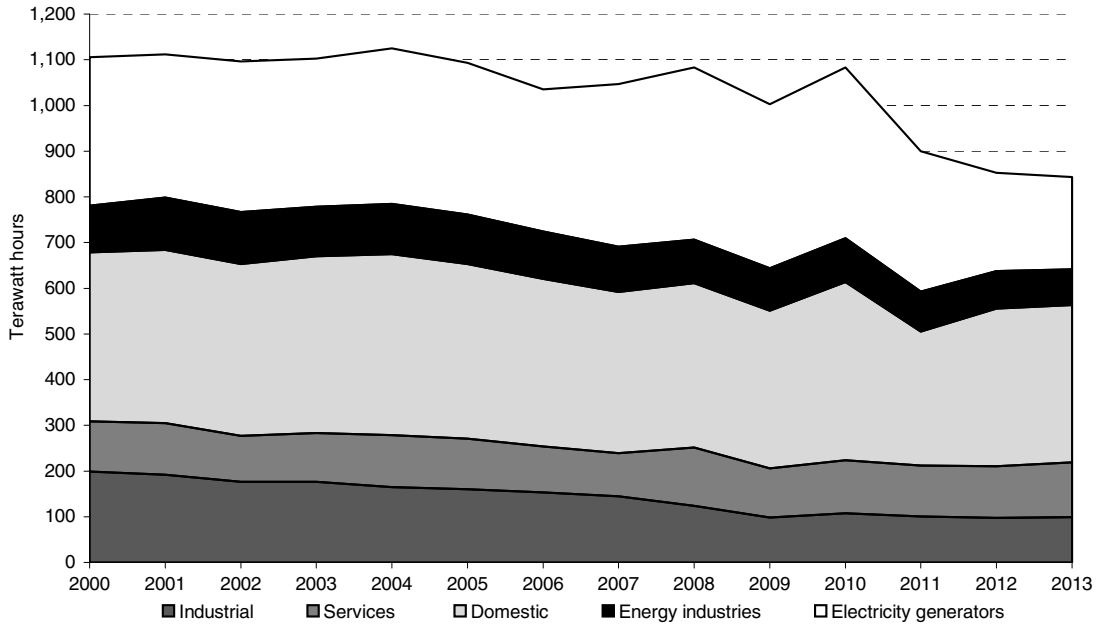


4.7 Total gas demand (including colliery methane) continued its decline in 2013, from 860 TWh in 2012 to 851 TWh in 2013, a 1.1 per cent decline. Gas demand has now fallen each year since 2010, although the rate of decline has slowed each year.

4.8 Chart 4.2 shows gas use by sector. Gas demand was broadly flat across most sectors in 2013 versus 2012. The largest reduction was a 5.7 per cent fall in gas used for electricity generation in 2013, reflecting the continued shift away from gas for electricity generation. Gas used by the energy industry was similarly down by 5.5 per cent. Chart 4.2 shows the importance of temperature on short-term gas demand patterns (especially in the domestic sector), with demand being higher in 2010 (a cold year, average temperature 9°C) and lower in 2011 (a warm year, average temperature 10.7°C). More detailed analysis of gas consumption in the domestic sector is available in the National Energy Efficiency Data-Framework (NEED): www.gov.uk/government/collections/national-energy-efficiency-data-need-framework

4.9 Services gas consumption showed the largest increase between 2012 and 2013, increasing by 6.1 per cent (see Table 4.1.1), reflecting the continued UK economic recovery. Domestic gas consumption was almost flat in 2013 versus 2012; this reflects the similar overall temperatures seen in 2013 versus 2012. Gas consumption in the industrial sector increased by 1.7 per cent in 2013 versus 2012, the first increase in industrial annual gas consumption since 2010. Sectoral breakdowns of gas use have been modified since last year to more accurately represent consumption (see paragraph 4.30). Definitions for each sector in Chart 4.2 are provided in paragraph 4.31.

Chart 4.2: Consumption of natural gas 2000 to 2013



UK continental shelf and onshore natural gas (Table 4.3)

4.10 Table 4.3 shows natural gas flows, from production, through transmission and onto consumption. This table departs from the standard balance methodology and definitions to maintain the link with historical data and with monthly data given on DECC's energy statistics website. The relationship between total UK gas consumption shown in Table 4.3 and total demand for natural gas given in Table 4.1 is illustrated in the technical notes and definitions (paragraphs 4.34 to 4.37).

4.11 Table 4.3 also includes two rows at the bottom of the table showing gas stocks and gas storage capacity at the end of the year. Storage data are not available before 2004. Stocks data for 2006 onwards have been sourced from the National Grid and storage capacity data from its 2012 Ten Year Statement.

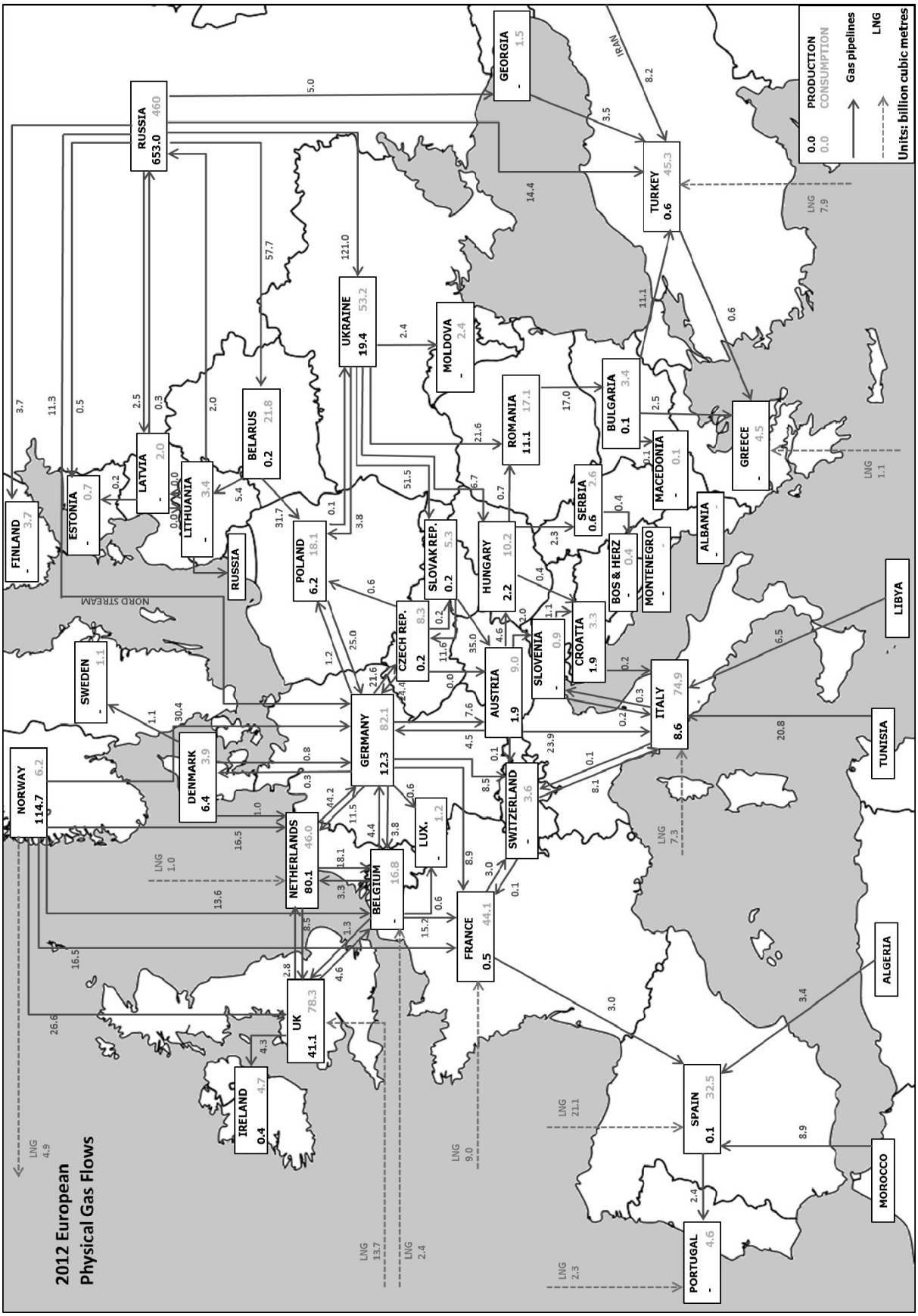
Gas storage sites and import/export pipelines (Table 4.4)

4.12 This table details current gas storage facilities in the UK as of 31 May 2014 and also the two operational pipelines that bring gas to the UK from continental Europe. Significant increases in onshore and offshore storage capacity/deliverability are being considered at existing and new sites. National Grid's Gas Transportation Ten Year Statement includes public details of such projects in Great Britain. Total storage in the UK stands at 4.6 billion cubic metres, with total demand for 2013 recorded at 78 billion cubic metres.

Natural gas imports and exports (Tables 4.5 and 4.6)

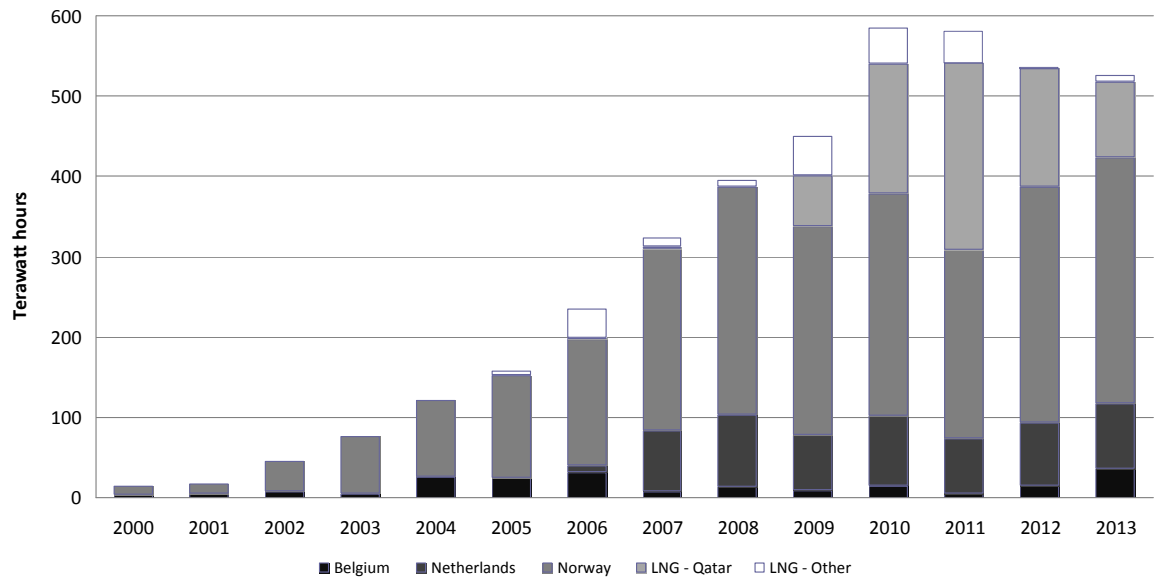
4.13 These tables show how much gas was imported to, and exported from, the UK via i.) the interconnector pipelines, ii.) UKCS gas fields using the Dutch offshore pipeline system, and iii.) via ships to the UK's LNG terminals. Norwegian gross gas imports were 58 per cent of total gas imports compared to 55 per cent in 2012. In 2013, 46 per cent of gas exports were to continental Europe, with the remaining 54 per cent to the Republic of Ireland. The flows of gas across Europe for 2012 are illustrated in Map 4.1, originally published in Energy Trends March 2014 www.gov.uk/government/publications/energy-trends-march-2014.

Map 4.1: Gas European Transit System



Source: International Energy Agency and DECC. 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 is based on 2012 data.

Chart 4.3: Imports of Natural Gas 2000 to 2013

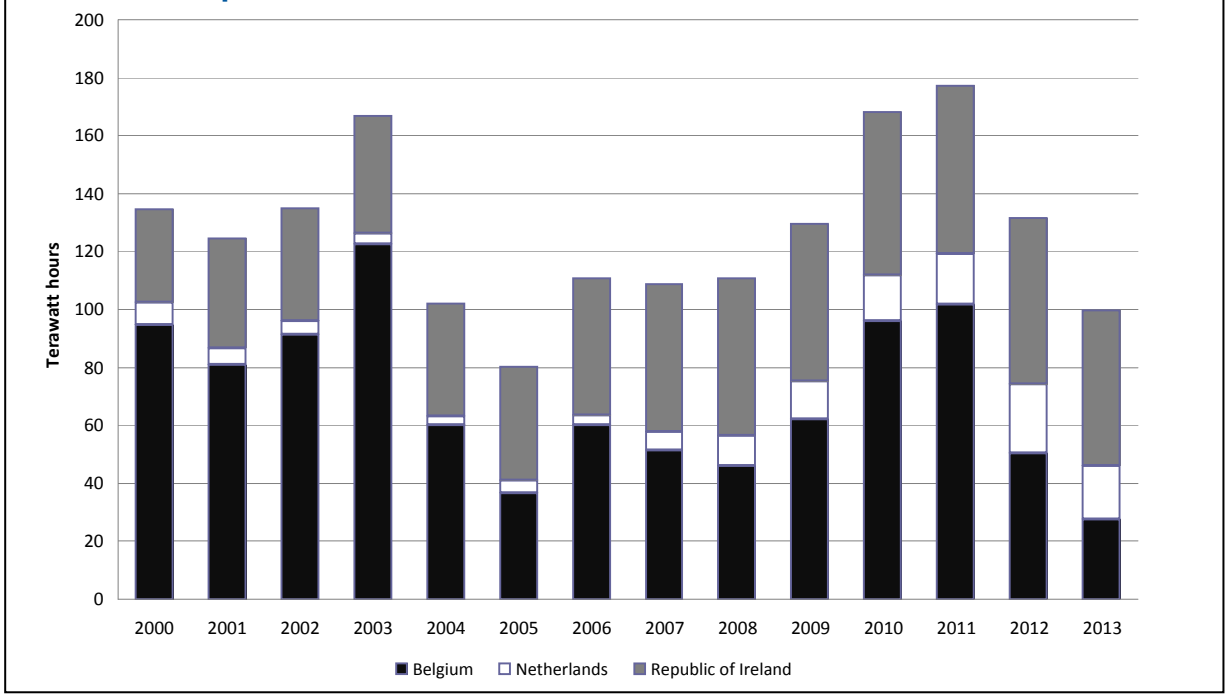


4.14 Chart 4.3 shows the share of natural gas imports by interconnector pipelines and LNG since 2000. The methodology for calculating LNG imports has been updated for 2008 to 2013 to reflect LNG terminal own use (details provided in special article in Energy Trends June 2014: www.gov.uk/government/uploads/system/uploads/attachment_data/file/326368/ET_June_2014.pdf). Imports have increased sharply since 2000, reflecting the decline in the UK's indigenous production. Pipeline imports comprised 80 per cent of natural gas imports in 2013, with LNG making up 20 per cent. Over the past three years overall imports have declined; this reflects the decrease in natural gas demand during this time (see Chart 4.2).

4.15 The UK imports natural gas via pipeline (from Norway, the Netherlands and Belgium) and shipped LNG (to terminals at Milford Haven (South Hook and Dragon), the Isle of Grain and Teesside Gasport). Over recent years, the most significant changes to the UK's import diversity include the completion of the interconnector from the Netherlands at the end of 2006 (resulting in significant natural gas imports from the Netherlands) and completion of two new LNG terminals in 2009. LNG's share of total gas imports have risen from 25 per cent in 2009 to 47 per cent in 2011, but fell to 20 per cent in 2013 because of increased demand from Asia driving up prices. Despite this, LNG remains an important component of the UK's energy mix. In 2013, Qatar accounted for 93 per cent of LNG imports. The origins of LNG imports can be found in Table 4.5 and the total import volumes by each LNG terminal in Table 4.6.

4.16 The increased import infrastructure afforded by the new LNG terminals has ensured that UK exports remain robust, despite the decrease in the UK's production. Chart 4.4 shows a significant increase in UK exports since the turn of the decade, with record levels of exports in 2011. However, the fall in LNG imports saw exports to Belgium almost halve in 2013 compared with 2012. Exports to the Republic of Ireland were 7.1 per cent lower than in 2012. Additionally, a small amount of gas is exported to the Norwegian Continental Shelf for injection into the Ula field reservoir, but this accounts for less than 0.1 per cent of total exports. The total volume of gas traded in 2013 was down 7 per cent to 645 TWh.

Chart 4.4: Exports of Natural Gas 2000 to 2013



Sub-national gas data

4.17 Table 4A gives the number of consumers with a gas demand below 73,200 kWh per year in gas year 2012 (see Technical Terms and Definitions) and the total number of gas consumers. 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. It should be noted that the data are for gas year 2012, which is approximately one year in arrears of the other data presented in this chapter (aside from the European gas map). Table 4A excludes around 15,500 customers (approximately 0.07 per cent) who were not allocated to a region.

Table 4A: Consumption by gas customers by region in 2012[1]

	Consumption by customers below 73,200 kWh (2,500 therms) annual demand		Consumption by all customers (where regional classification is possible)	
Region/Country	Number of consumers (thousands)	Gas sales 2012 (GWh)	Number of consumers (thousands)	Gas sales 2012 (GWh)
North East	1,086	15,672	1,097	39,998
North West	2,853	40,124	2,885	66,507
Yorkshire and the Humber	2,097	30,525	2,122	52,805
East Midlands	1,735	24,876	1,754	39,271
West Midlands	2,085	29,267	2,109	45,479
East	2,031	28,865	2,054	45,131
London	3,008	41,695	3,050	63,141
South East	3,156	45,386	3,196	64,137
South West	1,803	22,380	1,822	33,439
Wales	1,108	14,933	1,118	24,607
Scotland	1,936	28,702	1,961	50,479
Great Britain	22,898	322,424	23,169	524,995

Source: Xoserve and the independent gas transporters.

[1] These data cover the gas year (1st October to 30th September). Please note that the gas data are weather normalised.

[2] Customers with an annual consumption of 73,200 kWh or lower will include some small industrial and commercial consumers.

[3] Data excludes approximately 15,500 customers (393 GWh of sales) for whom regional allocation was not possible.

4.18 In March 2013, DECC published sub-national energy statistics data on its website: www.gov.uk/government/collections/sub-national-gas-consumption-data, including consumption data at both regional ("NUTS1") and local ("LAU1") level (see article in December 2011 Energy Trends for definition). Data for earlier years are presented on the website.

Table 4B: Domestic gas market penetration (in terms of percentage of customers supplied) by region and payment type, Quarter 4 2013

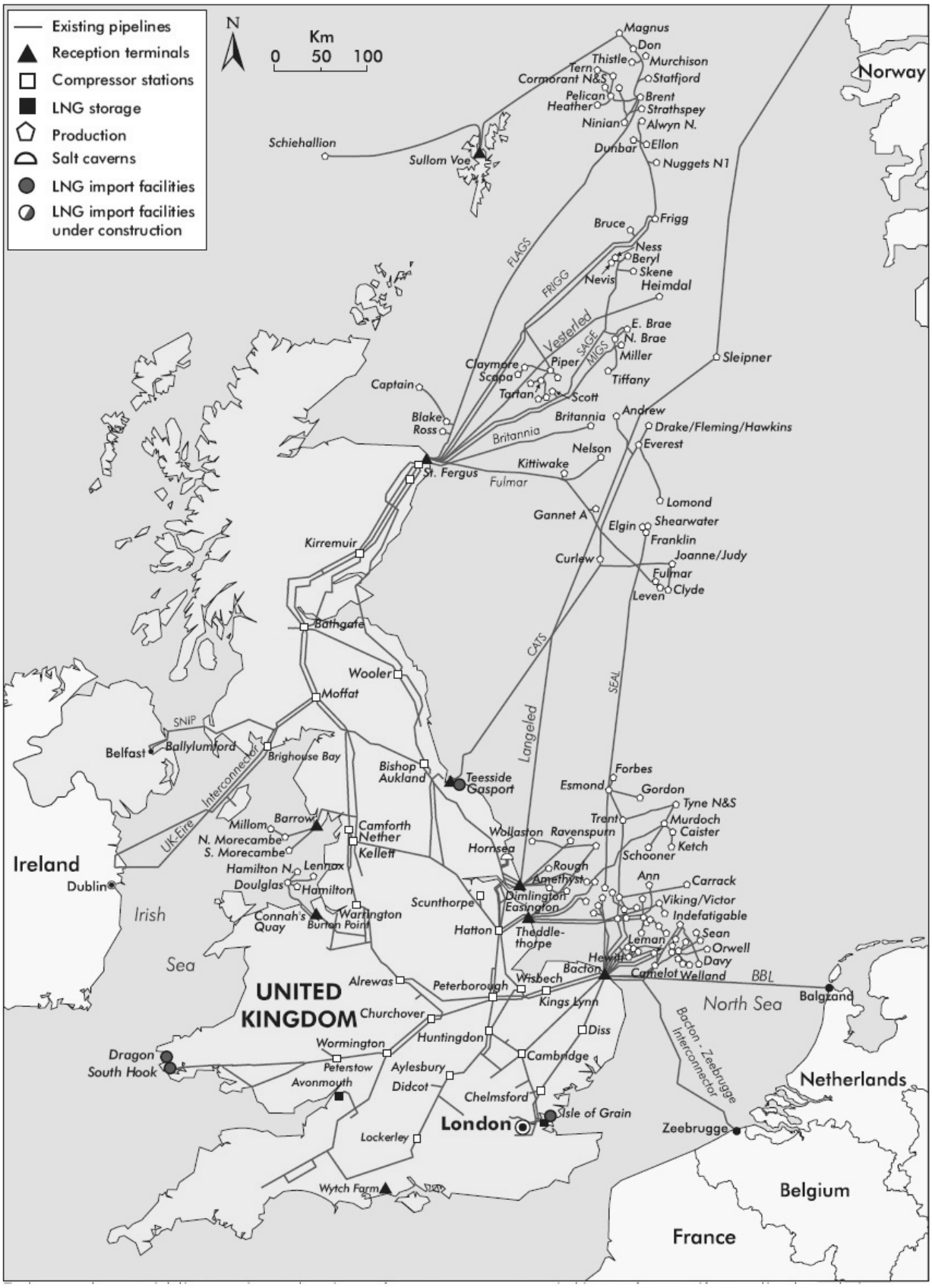
	British Gas Trading			Non-British Gas		
Region/Country[1]	Credit	Direct Debit	Prepayment	Credit	Direct Debit	Prepayment
North Scotland	43	23	28	57	77	72
South Wales	45	27	23	55	73	77
North East	49	26	33	51	74	67
South East	53	29	41	47	71	59
East Midlands	51	30	43	49	70	57
Southern	55	31	41	45	69	59
South West	56	32	40	44	68	60
Yorkshire	56	31	49	44	69	51
South Scotland	59	35	38	41	65	62
Eastern	57	34	47	43	66	53
West Midlands	59	32	49	41	68	51
North West	58	35	50	42	65	50
Merseyside & N Wales	59	36	46	41	64	54
London	62	38	53	38	62	47
Great Britain	56	32	43	44	68	57

[1] *The regions used in this table are the distribution areas of the former public electricity suppliers. This marks a change from previous years, where regions were based on Transco local distribution zones (LDZs).*

4.19 By the end of December 2013, over 60 per cent were no longer supplied by British Gas. Table 4B gives market penetration in more detail, by distribution areas of the former public electricity suppliers supplied by the larger energy companies. Data on the share of the smaller companies are not currently available and the table has not been adjusted for survey coverage. For all types of domestic customer, it is in the markets in North Scotland, South Wales and the North East of England that new suppliers have had most success. As of the end of 2013, the share of the market not supplied by British Gas stood at 44 per cent of the credit market, 68 per cent of the direct debit market, and 57 per cent of the pre-payment market.

4.20 Competition in the domestic market remained broadly unchanged between 2008 and 2012. In 2013, the largest three suppliers accounted for just under two thirds of sales and the largest six accounting for over 90 per cent. Data on supply into the industrial sector in 2013 show that the largest three suppliers accounted for 50 per cent and the largest six suppliers 81 per cent of sales. The commercial sector remains similar to last year, with the largest three and largest six suppliers accounting for 53 and 87 per cent of sales respectively.

Map 4.2: The National Gas Transmission System 2013



Source: International Energy Agency and DECC

Technical notes and definitions

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 1.29 to 1.63. 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 five 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

4.21 **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 on DECC's energy statistics web site under 'Production of gas' - www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes. 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.

4.22 **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.

4.23 **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 2.54 in Chapter 2.

4.24 **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 2009 to 2013 are shown in Table 4.2 and estimates for 2011 to 2013 in Table 4.1. The estimates for the years up to 2011 have been obtained from AEA's work for the National Atmospheric Emissions Inventory; 2012-13 data are DECC extrapolations. For DUKES 2015, we will be exploring non-energy use in more detail to improve the accuracy of these data.

Sectors used for sales/consumption

4.25 For definitions of the various sectors used for sales and consumption analyses see Chapter 1 paragraphs 1.55 to 1.60 and Annex A, paragraphs A.31 to A.42.

Data collection

4.26 Production figures are generally obtained from returns made under DECC's Petroleum Production Reporting System (PPRS). DECC also 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 UK Continental Shelf (UKCS) producers who supply gas directly to customers, (see paragraph 4.28).

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

4.28 DECC carry out an annual survey of gas suppliers to obtain details of gas sales to the various categories of consumer. The larger gas suppliers (defined as 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) provide a detailed breakdown of sales for final consumption to DECC on an annual basis. This provides the main data source for the UK's gas demand. Prior to 2013 data, companies supplying less than 1,750 GWh provided gas sales as a single sum which was then apportioned across sectors using the same proportional split as seen in the data from the large suppliers. From 2013 onwards, data from smaller suppliers were provided broken down by broad sector (e.g. domestic, other industry etc.) to allow more accurate apportioning of these data.

4.29 Data on sectoral gas use are primarily derived from surveys of large and small gas suppliers. Beyond this, data for electricity generation by major power producers are adjusted, such that the data agree with a separate data set collected via the Major Power Producers' (MPP) survey. Data for autogenerators are similarly adjusted to match CHP data (see Chapter 7) provided to DECC, with the appropriate amount of gas used for autogeneration being subtracted from each sector and added to the autogeneration figure. The same methodology is applied for heat sold, which makes up the heat generation figure. 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.

4.30 We have updated our gas data collection methodology and analysis this year (see Energy Trends June 2014 special feature for details: www.gov.uk/government/publications/energy-trends-june-2014). This change in methodology has resulted in shifts in sectoral gas use going back to 2008. In particular, gas use has shifted out of the industrial sector, with a subsequent increase in the services sector.

4.31 The sectors as defined in Chart 4.2 can be mapped across from Table 4.1 as follows: Industrial = Coke manufacture + Blast furnaces + Industry (sum) + Non energy use. Services = Public administration + Commercial + Agriculture + Miscellaneous. Domestic = Domestic. Energy industries = Heat generation + Oil and gas extraction + Petroleum refineries + Coal extraction + Other (Energy industry use). Electricity generators = Electricity generation.

Period covered

4.32 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 5.83 and 5.84.

Monthly and quarterly data

4.33 Monthly data on natural gas production and supply are available from DECC's energy statistics website: www.gov.uk/government/collections/gas-statistics 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.

Statistical and metering differences

4.34 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 UK 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 UK 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.

4.35 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.

4.36 The relationship between total UK gas consumption shown in this Table 4.3 and total demand for natural gas given in the balance Table 4.1 is illustrated for 2013 as follows:

	GWh
Total UK consumption (Table 4.3)	792,817
Plus producers' own use	46,556
Plus operators' own use	3,534
	Equals
Consumption of natural gas	842,907
Plus upstream losses and metering differences	-
Plus downstream losses – leakage assessment	1,537
Plus downstream losses – own gas use	34
Plus downstream losses – theft	203
Plus downstream losses – iron and steel losses	2
Plus downstream metering differences	5,697
	Equals
Total demand for natural gas (Table 4.1)	850,380

4.37 The statistical difference row in Table 4.1 is made up of the following components in 2013:

	GWh
Statistical difference between gas available at terminals and gas input to downstream (Table 4.3)	-440
Plus Downstream gas industry: Distribution losses and metering differences	215
	Equals
Statistical difference for natural gas (Table 4.1)	-225

4.38 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 PPRS 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.

4.39 The differences in the natural gas commodity balances 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.

4.40 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.

4.41 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 prior to 2013. For example, in 2012, the allocation of about 5 per cent of demand is estimated.

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4.1 Commodity balances

Natural gas

GWh

	2011			2012			2013		
	Natural gas	Colliery methane	Total Natural gas	Natural gas	Colliery methane	Total Natural gas	Natural gas	Colliery methane	Total Natural gas
Supply									
Production	526,030	680r	526,711r	452,094	602r	452,696r	424,153	604	424,757
Other sources	-	-	-	-	-	-	-	-	-
Imports	588,475r	-	588,475r	549,518r	-	549,518r	535,105	-	535,105
Exports	-183,689	-	-183,689	-144,023	-	-144,023	-109,664	-	-109,664
Marine bunkers	-	-	-	-	-	-	-	-	-
Stock change *(1)*	-22,623	-	-22,623	-269	-	-269	+621	-	621
Transfers *(2)*	-60	-	-60	-56	-	-56	-61	-	-61
Total supply	**908,133r**	**680r**	**908,813r**	**857,265r**	**602r**	**857,867r**	**850,155**	**604**	**850,759**
Statistical difference *(3)*	-856r	-	-856r	-2,354r	-	-2,354r	-225	-	-225
Total demand	**908,989r**	**680r**	**909,669r**	**859,619r**	**602r**	**860,222r**	**850,381**	**604**	**850,984**
Transformation	**329,578r**	**497r**	**330,076**	**239,243r**	**486r**	**239,729r**	**224,992**	**491**	**225,483**
Electricity generation	306,642r	497r	307,140	214,152r	486r	214,638r	201,834	491	202,325
Major power producers	275,591	-	275,591	182,409r	-	182,409r	171,551	-	171,551
Autogenerators	31,051r	497r	31,548	31,742r	486r	32,229r	30,283	491	30,773
Heat generation *(4)*	22,936	-	22,936	25,091r	-	25,091r	23,158	-	23,158
Petroleum refineries	-	-	-	-	-	-	-	-	-
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Energy industry use	**64,443r**	**162r**	**64,605r**	**57,235r**	**98r**	**57,333r**	**54,775**	**98**	**54,873**
Electricity generation	-	-	-	-	-	-	-	-	-
Oil and gas extraction	53,163r	-	53,163r	48,461r	-	48,461r	46,556	-	46,556
Petroleum refineries	1,757r	-	1,757r	1,619r	-	1,619r	1,151	-	1,151
Coal extraction	61r	162r	223r	96r	98r	194r	60	98	158
Coke manufacture	-	-	-	-	-	-	-	-	-
Blast furnaces	453	-	453	266	-	266	363	-	363
Patent fuel manufacture	-	-	-	-	-	-	-	-	-
Pumped storage	-	-	-	-	-	-	-	-	-
Other	9,009r	-	9,009r	6,793r	-	6,793r	6,645	-	6,645
Losses *(5)*	**9,926r**	-	**9,926r**	**7,891r**	-	**7,891r**	**7,474**	-	**7,474**
Final consumption	**505,041r**	**21**	**505,062r**	**555,250r**	**18**	**555,268r**	**563,139**	**15**	**563,154**
Industry	**94,494r**	**21**	**94,515r**	**91,506r**	**18**	**91,524r**	**93,292**	**15**	**93,307**
Unclassified	-	21	21	-	18	18	-	15	15
Iron and steel	5,829r	-	5,829r	5,091r	-	5,091r	5,338	-	5,338
Non-ferrous metals	1,840r	-	1,840r	1,890r	-	1,890r	1,922	-	1,922
Mineral products	16,093r	-	16,093r	15,092r	-	15,092r	15,181	-	15,181
Chemicals	16,034r	-	16,034r	15,207r	-	15,207r	15,465	-	15,465
Mechanical Engineering, etc	5,661r	-	5,661r	5,836r	-	5,836r	5,657	-	5,657
Electrical engineering, etc	2,529r	-	2,529r	2,633r	-	2,633r	2,612	-	2,612
Vehicles	3,762r	-	3,762r	4,006r	-	4,006r	4,489	-	4,489
Food, beverages, etc	20,516r	-	20,516r	20,163r	-	20,163r	20,354	-	20,354
Textiles, leather, etc	5,348r	-	5,348r	5,233r	-	5,233r	5,158	-	5,158
Paper, printing, etc	7,458r	-	7,458r	7,081r	-	7,081r	7,506	-	7,506
Other industries	5,155r	-	5,155r	5,069r	-	5,069r	5,220	-	5,220
Construction	4,270r	-	4,270r	4,205r	-	4,205r	4,387	-	4,387
Transport	-	-	-	-	-	-	-	-	-
Air	-	-	-	-	-	-	-	-	-
Rail	-	-	-	-	-	-	-	-	-
Road	-	-	-	-	-	-	-	-	-
National navigation	-	-	-	-	-	-	-	-	-
Pipelines	-	-	-	-	-	-	-	-	-
Other	**404,597r**	-	**404,597r**	**457,974r**	-	**457,974r**	**464,250**	-	**464,250**
Domestic	293,400	-	293,400	345,080r	-	345,080r	344,501	-	344,501
Public administration	42,960r	-	42,960r	43,243r	-	43,243r	44,495	-	44,495
Commercial	55,757r	-	55,757r	57,377r	-	57,377r	60,286	-	60,286
Agriculture	1,351r	-	1,351r	1,162r	-	1,162r	1,097	-	1,097
Miscellaneous	11,130r	-	11,130r	11,111r	-	11,111r	13,871	-	13,871
Non energy use	**5,949**	-	**5,949**	**5,771r**	-	**5,771r**	**5,598**	-	**5,598**

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

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

(3) Total supply minus total demand.

(4) Heat sold to third parties. Heat generation data are not available before 1999. For earlier years gas used to generate heat for sale is allocated to final consumption by sector.

(5) Refers to downstream losses. For an explanation of what is included under these losses, see paragraph 4.36.

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

GWh

	2009	2010	2011	2012	2013
Supply					
Production	694,687r	665,182r	526,711r	452,696r	424,757
Imports	457,447r	592,554r	588,475r	549,518r	535,105
Exports	-137,100	-176,399	-183,689	-144,023	-109,664
Stock change *(2)*	-4,876	+15,271	-22,623	-269	+621
Transfers	-351	-263	-60	-56	-61
Total supply	**1,009,807r**	**1,096,345r**	**908,813r**	**857,867r**	**850,759**
Statistical difference *(3)*	-4,136r	+512r	-856r	-2,354r	-225
Total demand	**1,013,943r**	**1,095,833r**	**909,669r**	**860,222r**	**850,984**
Transformation	**382,061r**	**397,293**	**330,076**	**239,729r**	**225,483**
Electricity generation	359,303r	373,586	307,140	214,638r	202,325
Major power producers	328,249	342,150	275,591	182,409r	171,551
Autogenerators	31,054r	31,436	31,548	32,229r	30,773
Heat generation	22,758	23,707	22,936	25,091r	23,158
Other	-	-	-	-	-
Energy industry use	**70,597r**	**73,219r**	**64,605r**	**57,333r**	**54,873**
Electricity generation	-	-	-	-	-
Oil and gas extraction	61,110r	61,124r	53,163r	48,461r	46,556
Petroleum refineries	1,601r	1,785r	1,757r	1,619r	1,151
Coal extraction	217r	260r	223r	194r	158
Coke manufacture	-	-	-	-	-
Blast furnaces	450	641	453	266	363
Other	7,218r	9,409r	9,009r	6,793r	6,645
Losses *(4)*	**11,144r**	**12,795r**	**9,926r**	**7,891r**	**7,474**
Final consumption	**550,142r**	**612,526r**	**505,062r**	**555,268r**	**563,154**
Industry	**91,264r**	**98,929r**	**94,515r**	**91,524r**	**93,307**
Unclassified	29	25	21	18	15
Iron and steel	5,346r	6,124r	5,829r	5,091r	5,338
Non-ferrous metals	1,633r	1,856r	1,840r	1,890r	1,922
Mineral products	17,664r	18,562r	16,093r	15,092r	15,181
Chemicals	17,452r	17,467r	16,034r	15,207r	15,465
Mechanical engineering, etc	4,680r	5,556r	5,661r	5,836r	5,657
Electrical engineering, etc	2,519r	2,635r	2,529r	2,633r	2,612
Vehicles	2,730r	3,533r	3,762r	4,006r	4,489
Food, beverages, etc	17,993r	19,936r	20,516r	20,163r	20,354
Textiles, leather, etc	4,908r	5,425r	5,348r	5,233r	5,158
Paper, printing, etc	7,677r	8,140r	7,458r	7,081r	7,506
Other industries	4,900r	5,373r	5,155r	5,069r	5,220
Construction	3,732r	4,296r	4,270r	4,205r	4,387
Transport	-	-	-	-	-
Road *(5)*	-	-	-	-	-
Other	**451,991r**	**505,508r**	**404,597r**	**457,974r**	**464,250**
Domestic	344,499r	389,595	293,400	345,080r	344,501
Public administration	42,372r	45,473r	42,960r	43,243r	44,495
Commercial	53,025r	57,320r	55,757r	57,377r	60,286
Agriculture	1,468r	1,619r	1,351r	1,162r	1,097
Miscellaneous	10,627r	11,501r	11,130r	11,111r	13,871
Non energy use	**6,887**	**8,089**	**5,949**	**5,771r**	**5,598**

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

	2009	2010	2011	2012	2013
Total production	**721r**	**829r**	**680r**	**602r**	**604**
Electricity generation	553	618	497r	486r	491
Coal extraction	139r	186r	162r	98r	98
Other industries	29	25	21	18	15
Total consumption	**721**	**829**	**680**	**602**	**604**

(2) Stock fall (+), stock rise (-).
(3) Total supply minus total demand.
(4) Refers to downstream losses. For an explanation of what is included under these losses, see paragraph 4.36.

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

GWh

	2009	2010	2011	2012	2013
Upstream gas industry:					
Gross production *(2)*	693,965	664,353	526,030	452,094	424,153
Minus Producers' own use *(3)*	61,110	61,124	53,163	48,461	46,556
Exports	137,100	176,399	183,689	144,023	109,664
Plus Imports of gas	457,447r	592,554r	588,475r	549,518r	535,105
Gas available at terminals *(4)*	953,203r	1,019,384r	877,653r	809,129r	803,038
Minus Statistical difference *(5)*	-1,173	68	-662	-331	-440
Downstream gas industry:					
Gas input into the national transmission system *(6)*	954,375r	1,019,316	878,316	809,460	803,478
Minus Operators' own use (7)	4,469r	6,268	5,852	3,900	3,534
Stock change (storage sites) *(8)*	4,876	-15,271	22,623	269	-621
Metering differences *(5)*	9,111	10,848	8,037	6,099	5,697
Gas output from the national transmission system *(9)*	935,920	1,017,471	841,804	799,191	794,869
Minus Leakage assessment *(10)*	1,724r	1,642r	1,603r	1,537r	1,537
Own use gas *(11)*	33	33r	32r	34r	34
Theft *(12)*	244r	270r	252r	218r	203
Transfers *(13)*	351	263	60	56	61
Losses *(14)*	31	3	3	3	2
Statistical difference and metering differences *(5)*	-2,963r	444r	-194r	-2,024r	215
Total UK consumption *(15)*	**936,499r**	**1,014,817**	**840,048r**	**799,368r**	**792,817**
Stocks of gas (at end year) *(16)*	36,011	20,740	43,363	43,632	43,011
Storage capacity *(17)*	47,310	47,310	47,310	47,310	47,310

(1) For details of where to find monthly updates of natural gas production and supply see paragraph 4.33.
(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.
(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 4.38 to 4.41.
(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) Currently quivalent to about 0.0113 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 0.02 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) Data for losses from the Iron and Steel Statistics Bureau Survey, converted from gigajoules to GWh assuming 0.2778 terajoules per GWh
(15) See paragraph 4.36 for an explanation of the relationship between these "Total UK consumption" figures and "Total demand" shown within the balance tables.
(16) Due to storage reconciliations, own use and metering differences, over a long period of years the stock levels based on gas put into storag and gas taken out of storage no longer reconciled with storage levels reported by National Grid. For 2011 action was taken to rectify this.
(17) Data compiled by DECC from individual storage site information. Converted from billion cubic metres to GWh assuming 11.02 kWh per cubic metre.

4.4 Gas storage sites and import/export facilities in the United Kingdom at 31 May 2014

Owner	Site	Location	Space (Billion m^3)	Approximate maximum delivery (Million m^3/day)	Type	Status *(2)*
Operational storage						
Centrica Storage Ltd	Rough	Southern North Sea	3.30	41	Depleted field	Long
Scottish and Southern Energy & Statoil	Aldbrough	East Yorkshire	0.30	40	Salt cavern	Medium
E.ON	Holford	Cheshire	0.20	22	Salt cavern	Medium
Scottish and Southern Energy	Hornsea	East Yorkshire	0.30	18	Salt cavern	Medium
EDF Trading	Holehouse Farm	Cheshire	0.05	11	Salt cavern	Medium
Humbly Grove Energy	Humbly Grove	Hampshire	0.30	7	Depleted field	Medium
Scottish Power	Hatfield Moor	South Yorkshire	0.07	2	Depleted field	Medium
National Grid LNGS	Avonmouth	Avon and Somerset	0.08	13	LNG	Short

Facilities	Owner	Between / Location	Max flow rate (Million m^3/day)
Imports			
Operational pipelines			
Bacton-Zeebrugge Interconnector	Interconnector (UK) Limited	Zeebrugge and Bacton	74
Langeled Pipeline	Gassco	Nyhamna and Easington	72
BBL Pipeline	BBL Company	Balgzand and Bacton	48
Vesterled Pipeline	Gassco	Heimdal Riser Platform	39
Tampen Link	Gassco	Links Statfjord to FLAGS (terminating at St Fergus)	27
Gjøa Pipeline	Gassco	Links Gjøa/Vega to FLAGS and St Fergus (terminating at St Fergus)	17
Liquefied Natural Gas (LNG) terminals			
South Hook	Qatar Petroleum and ExxonMobil	Milford Haven	58
Isle of Grain	National Grid Grain LNG	Kent	56
Dragon	BG Group and Petronas	Milford Haven	24
Teesside GasPort	Excelerate	Teesside	11
Exports			
Bacton-Zeebrugge Interconnector	Interconnector (UK) Limited	Bacton and Zeebrugge	58
UK- Irish Gas Interconnector	Bord Gais	Moffat and Ireland	31

(1) Information on gas storage as detailed in the National Grid Gas Ten Year Statement 2013

(2) 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

	2009	2010	2011	2012	2013
Imports					
by pipelines from:					
Belgium *(2)*	7,945	13,568	4,032	14,264	35,367
The Netherlands *(3)*	69,529	87,120	69,001	78,258	81,519
Norway *(4)*	260,438	276,807	234,194	294,586	305,516
Liquefied Natural Gas (5)	112,238r	206,846r	274,794r	150,097r	102,620
of which:					
Algeria	*19,683r*	*11,697r*	*2,687r*	*1,311r*	*4,492*
Australia	*824r*	-	-	-	-
Egypt	*5,891r*	*1,282r*	*890r*	*145r*	*755*
Nigeria	-	*3,729r*	*13,025r*	*475r*	-
Norway	*1,890r*	*9,038r*	*10,114r*	*1,735r*	*1,068*
Qatar	*62,076r*	*162,384r*	*234,077r*	*146,431r*	*95,204*
Trinidad & Tobago	*21,873r*	*16,896r*	*5,903r*	-	*1,101*
USA	-	-	*1,575r*	-	-
Yemen	-	*1,821r*	*6,521r*	-	-
Total Imports	**450,150r**	**584,341r**	**582,021r**	**537,205r**	**525,022**
Exports to:					
Belgium *(2)*	62,084	95,932	101,526	50,343	27,458
The Netherlands *(6)*	13,094	15,830	17,544	23,729	18,597
Norway *(7)*	266	158	125	49	20
Republic of Ireland *(8)*	54,357	56,266	58,041	57,590	53,508
Total Exports	**129,801**	**168,186**	**177,236**	**131,711**	**99,583**
Net Imports *(9)*	**320,349r**	**416,155r**	**404,785r**	**405,494r**	**425,439**

(1) This table is also shown as Table G.5 of the Internet Annex G to the Digest.

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

(3) Physical flows via the Bacton-Balgzand (BBL) pipeline. Commissioned in November 2006.

(4) Currently via the Langeled and Vesterled pipelines, the Tampen Link (from Statfjord to FLAGS) and Gjoa/Vega (to FLAGS).

(5) From various sources to the Isle of Grain, Milford Haven and Teesside.

(6) Direct exports from the Grove, Chiswick, Markham, Minke, Stamford, Windermere and Wingate 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.

4.6 Liquefied Natural Gas imports by terminal

GWh

	2009	2010	2011	2012	2013
LNG Imports via:					
Dragon (*Milford Haven) (1)*	10,185r	19,383r	28,790r	1,819r	968
Isle of Grain (*Isle of Grain*) *(2)*	51,240r	60,667r	86,357r	38,196r	15,664
South Hook (*Milford Haven*) *(3)*	49,988r	126,796r	159,646r	110,082r	85,989
Teesside GasPort (*Teesside*) *(4)*	825r	-	-	-	-
	112,238r	**206,846r**	**274,794r**	**150,097r**	**102,620**

(1) Dragon began importing LNG to the UK in August 2009.

(2) LNG imports at Canvey Island commenced in 1965 but ceased in the early 1980's when, with increasing supplies from the North Sea, imports were no longer required. UK natural gas production peaked in 2000 and as a result of falling production LNG imports recommenced at the Isle of Grain in 2005.

(3) South Hook began importing LNG to the UK in April 2009.

(4) Teesside GasPort was commissioned in February 2007.

Chapter 5
Electricity

Key points

- Electricity generation (including pumped storage) in the UK fell by 1.2 per cent, from 363 TWh in 2012 to 359 TWh in 2013. Total electricity supply (including net imports) decreased by 0.5 per cent. (Tables 5.5 and 5.1)
- Final consumption of electricity in 2013, at 317 TWh, was broadly unchanged (down 0.2 per cent) on 2012 and at its lowest level since 1998. (Table 5.1).
- Coal's share fell from 39 to 36 per cent, as generation fell from 143 TWh to 131 TWh; gas' share of generation fell from 28 per cent in 2012 to 27 per cent in 2013, as generation from gas fell from 100 TWh to 96 TWh (Table 5.5)
- Renewables' share of generation increased from 11 per cent in 2012 to a new record 15 per cent in 2013, as a result of increased capacity. (Table 6A, in chapter 6)
- Low carbon electricity's share of generation increased from 31 per cent to a record 35 per cent, mainly due to increased renewables generation. Nuclear generation increased marginally by 0.3 per cent.
- Total capacity was 4.4GW lower at the end of 2013 at 85GW, with the closure of several stations only partially offset by new renewables. (Table 5.6)
- The UK remained a net importer of electricity in 2013, with net imports contributing 3.9 per cent of electricity supply. (Table 5.1)

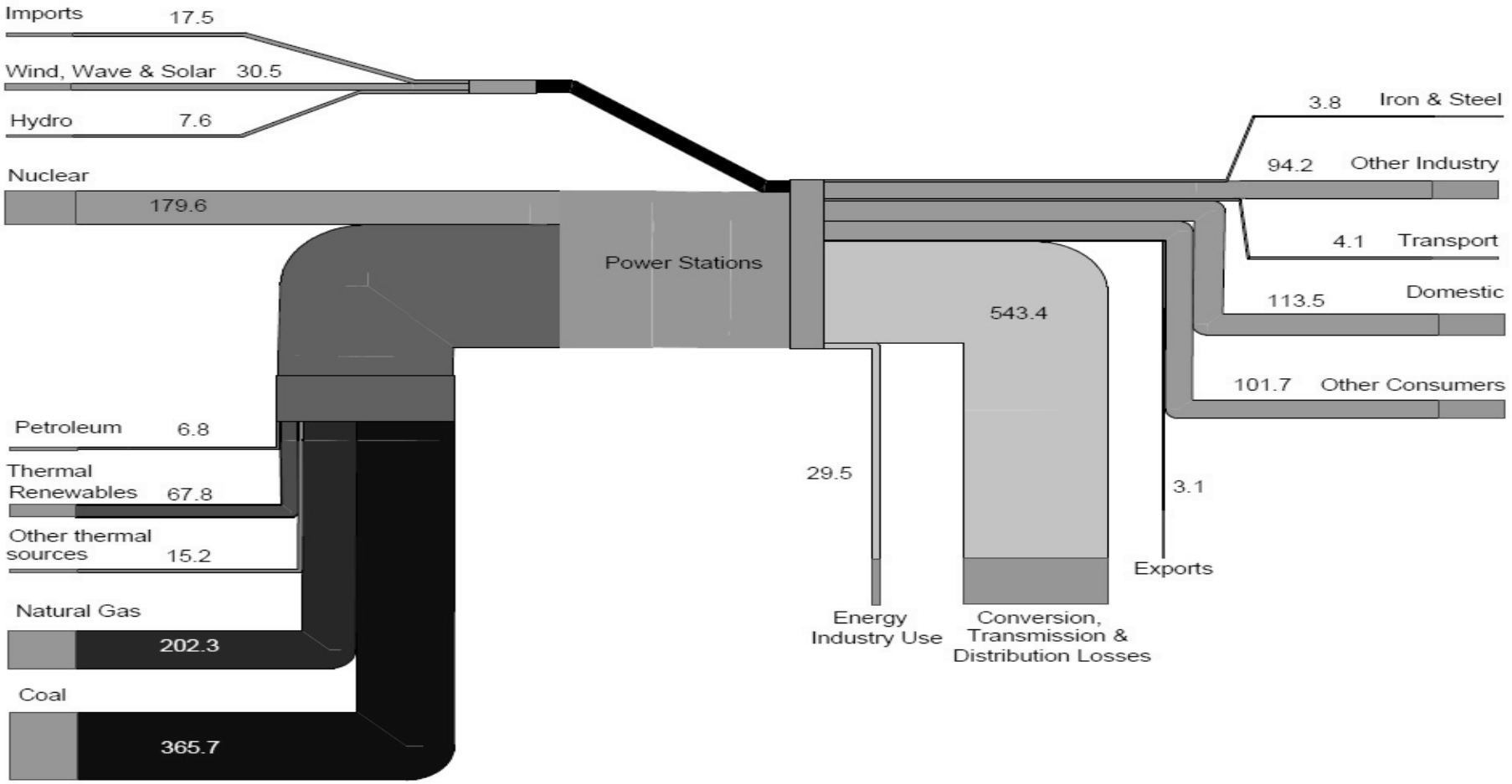
Introduction

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).

5.2 An energy flow chart for 2013, 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 tables. 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.

5.3 Commodity balances for electricity, for each of the last five years, form the introductory table (Table 5.1). Table 5.2 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 UK in each of the last five years are covered in Table 5.3. Table 5.4 shows the relationship between the commodity balance definitions and traditional Digest definitions of electricity, so that the most recent data can be linked to the long term trends data, which can be found on DECC's energy statistics web site. Table 5.5 shows the relationship between fuels used, generation and supply in each of the latest five years. Tables on plant capacity (Tables 5.6, 5.7 and 5.8) and on plant loads and efficiency (Table 5.9) have been included. Table 5.10 lists individual power stations in operation and is supplemented by a table showing large scale Combined Heat and Power (CHP) schemes in the UK (Table 5.11). The long term trends commentary and tables on fuel use, generation, supply and consumption back to 1970 can be found on DECC's energy statistics website, at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

Electricity flow chart 2013 (TWh)



Notes:
This flow chart is based on the data in Tables 5.1 (for imports, exports, use, losses and consumption) and 5.5 (fuel used).
1. Hydro includes generation from pumped storage while electricity used in pumping is included under Energy Industry Use.
2. Conversion, Transmission and Distribution Losses is calculated as fuel used (Table 5.5) minus generation (Table 5.5) plus losses (Table 5.1).

Commodity balances for electricity (Table 5.1)

5.4 In 2013, total electricity supply was 374 TWh, a fall of 0.5 per cent on 2012. Of this, just over 96 per cent of UK electricity supply was home produced and almost four per cent was from imports, net of exports. For electricity, supply is totally driven by demand – the impacts of improving energy efficiency and lower consumption in the domestic sector, left final consumption slightly lower than 2012 (see paragraph 5.13). In 2011, a mild winter had caused demand, and thus supply, to fall to its lowest level since 1997. Table 5A below summarises the trend in total generation and supply over the last three years.

Table 5A: Electricity generation and supply

GWh

	2011	2012	2013
Total Generation (excl.pumped storage)	364,346	360,439	356,253
Total Supply	373,473	375,277	373,581

5.5 In 2013, indigenous production fell by 1.2 per cent on 2012, to its lowest level since 1997. Of the 356 TWh produced (excluding pumped storage production), 90 per cent was from major power producers and 10 per cent from other generators, while 30 per cent was from primary sources (including nuclear, wind and hydro) and 70 per cent from secondary sources (including coal, gas and oil).

5.6 Net imports in 2013 were up by 22 per cent on 2012, to 14.4 TWh. Imports rose by 28 per cent to their highest level for at least 15 years, whilst exports were up by 66 per cent. In 2013, net imports from Continental Europe via interconnectors with France and the Netherlands increased by 37 per cent to 16.6 TWh, with the French interconnector providing 10.3 TWh and the Netherlands interconnector providing 6.3 TWh. Net exports to the Republic of Ireland in 2013 (via the Northern Ireland interconnector and the Wales interconnector, which opened in 2012) were almost 9 times the amount compared to 2012, accounting for 71 per cent of UK exports in 2013[1]. Net imports contributed 3.9 per cent of electricity supply in 2013, up from 3.2 per cent in 2012. Table 5B below shows the UK's net imports via interconnectors during the past three years.

Table 5B: Net Imports via interconnectors 2011 to 2013

GWh

	France - UK [1]	Ireland - N. Ireland [2]	Netherland - UK [1]	Ireland - Wales [1]	Total
2011	4,678	-246	1,791	0	6,222
2012	6,365	-153	5,763	-104	11,871
2013	10,302	-47	6,335	-2,161	14,429

1. Figures taken from the demand data available on the National Grid website at www2.nationalgrid.com/UK/Industry-information/Electricity-transmission-operational-data/Data-Explorer/.

2. Figures taken from data available on the SEMO website at www.semo.com/marketdata/pages/energysettlement.aspx.

5.7 Electricity generated by each type of fuel is also shown on the second page of Table 5.1. The link between electricity generated and electricity supplied is made in Table 5.5, and is discussed further in paragraphs 5.25 to 5.32.

5.8 Overall electricity demand fell by 0.6 per cent, from 376 TWh in 2012 to 374 TWh in 2013 [2]. Of total demand, 29 TWh (8 per cent) was used within the energy industry, 27 TWh (7 per cent) was accounted for by losses, and 317 TWh (85 per cent) was final consumption, which fell by 0.2 per cent on 2012, remaining at its lowest level since 1998.

5.9 Temperatures influence the actual level of consumption especially in the winter months, as customers adjust heating levels in their homes and businesses. In 2013, temperatures were on average marginally colder than 2012. Whilst the first quarter was 2.7 degrees cooler, the average

[1] An analysis of electricity flows across Europe was carried out by BERR in 2007 using data published by the International Energy Agency and Eurostat. This was published in *Energy Trends*, March 2008, available at: www.gov.uk/government/collections/energy-trends

[2] The term statistical difference is used to define the difference between total supply and total demand – see paragraph 5.90

temperature during the last six months of 2013 were 1.4 degrees warmer than 2012, and included the warmest December since 1988. In addition, March 2013 was the coldest March since 1962, contributing to a particularly cold first quarter.

5.10 With the warmer temperatures in the final quarter of 2013, domestic consumption fell by 1.1 per cent on 2012, from 115 TWh to 113 TWh. Domestic consumption has generally been declining on account of milder winters and continuing energy efficiency improvements. Commercial sector consumption in 2013 rose on 2012's level, by 0.8 per cent, to 79 TWh. Agriculture consumption rose by 0.1 per cent, while public administration consumption fell by 0.5 per cent on 2012.

5.11 With the manufacturing sector having slowed since 2010, industrial consumption of electricity increased marginally, by 0.2 per cent on 2012, from 97.8 TWh to 98.0 TWh. Consumption continued to fall steeply in the non-ferrous metal, by 12 per cent on 2012 (due to the closure of the Alcan Lynemouth aluminium smelter during 2012), but rose by 13 per cent in the iron and steel sector in 2013 after a fall in 2012, with much smaller falls seen in other sectors.

5.12 Consumption in the transport sector was up slightly in 2013, at 4.1 TWh, with a small increase in numbers of electric road vehicles. Despite this, 99 per cent of transport electricity consumption remained by rail.

5.13 Industrial consumption accounted for 26 per cent of total demand for electricity, less than the share of consumption by households (30 per cent), with transport and the services sector accounting for 28 per cent. Within the industrial sector, the three largest specified consuming industries are chemicals, food and paper, which together account for 40 per cent of industrial consumption, whilst other industries were the highest contributor at 21 per cent. Taken together, the engineering industries and vehicles accounted for a further 19 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. A note on the estimates included within these figures can be found in paragraph 5.86. Chart 5.1 shows the total demand for electricity in 2013, by final consumer.

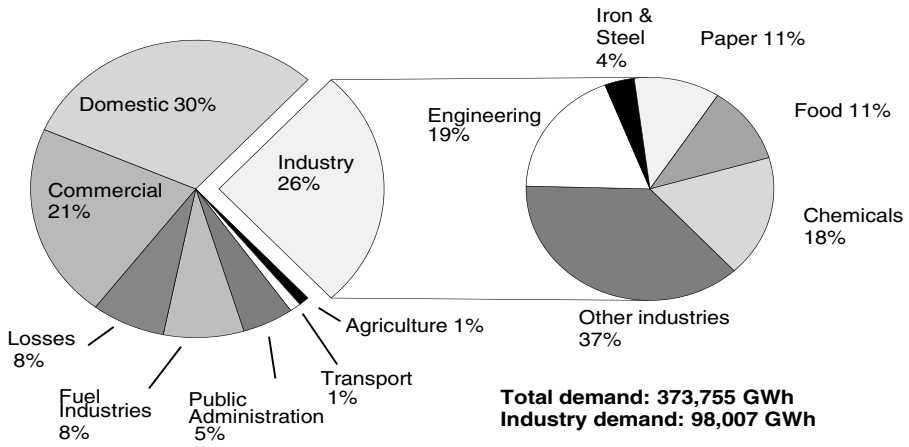
5.14 Consumption by the energy industries fell by less 0.1 per cent, after rising in 2012 to its highest level since 2008. This decrease was largely driven by a decrease in the amount of electricity used in generation, which accounts for 61 per cent of the energy industries' total use of electricity. This decrease was due to the fall in generation from coal power stations (which use more electricity in production than gas stations). Additionally, 13 per cent of energy industry use is accounted for by pumping at pumped storage stations (see 'pumped storage' line in Table 5.1), while petroleum refineries are also significant consumers with 14 per cent of energy industry use. Energy industry use as a proportion of total demand was 7.9 per cent in 2013, up 0.1 percentage points on 2012.

5.15 Losses as a proportion of electricity demand in 2013, at 7.2 per cent, were down by 0.5 percentage points on 2012 (7.7 per cent). The losses item has three components[3]:

- transmission losses (6.4 TWh) from the high voltage transmission system, which represented about 24 per cent of the figure in 2013;
- distribution losses (19.6 TWh), 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; and
- theft or meter fraud (1.0 TWh, around 4 per cent).

[3] See paragraph 5.78 for further information on the calculation of losses.

Chart 5.1: Electricity demand by sector 2013



Commodity balances for the public distribution system and for other generators (Table 5.2)

5.16 Table 5.2 expands on the commodity balance format to show consumption divided between electricity distributed over the public distribution system (PDS) and electricity provided by other generators (largely autogeneration and generation from renewable sources). Major power producers (MPPs) provide the majority of power to the PDS, with the remainder made up of transfers from other generators and net imports. Further information on the definitions of other generators and MPPs can be found in paragraph 5.66. Table 5.2 also expands the domestic sector (to show consumption by payment type) and the commercial sector (to show detailed data beyond that presented in Table 5.1).

5.17 The proportion of electricity supplied by the public distribution system remains unchanged from 2012 at 95 per cent. Of electricity supplied by other generators, 42 per cent (15.0 TWh) was transferred to the public distribution system in 2013, a decrease of around 4 percentage points on 2012.

5.18 In 2013, 4.6 per cent of final consumption of electricity was by other generators and did not pass over the public distribution system. This was similar to the 4.3 per cent in 2012. A substantial proportion of electricity used in the energy industries is self-generated (around 20 per cent in all three years shown in the table). At petroleum refineries the proportion is even higher; in 2013, 69 per cent of electricity consumed was self-generated.

5.19 In 2013, 8.7 per cent of the industrial demand for electricity was met by autogeneration, the same per cent as the previous year. 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.

5.20 Of the electricity consumed by the domestic sector in 2013, 17 per cent was reported as being purchased under some form of off-peak pricing structure (e.g. Economy 7), unchanged from 2012. Sixteen per cent of consumption was through prepayment systems again, broadly unchanged from the level in 2012.

5.21 Domestic consumption of electricity produced, and consumed, by households with micro-generation units (such as solar photovoltaic panels) installed is also shown in the table from 2010. The number of these installations has increased sharply since the Great Britain Feed in Tariff (FiT) scheme was launched in April 2010 (see paragraph 6.18 for further information on FiTs uptake). In 2013, consumption of self produced electricity by the domestic sector increased by 27 per cent on

2012, to stand at 771 GWh, more than twenty-five times the 31 GWh consumed in 2010. However, self-produced electricity still only accounts for only 0.7 per cent of domestic consumption.

Electricity fuel use, generation and supply (Tables 5.3 & 5.5)

5.22 In Table 5.3, 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 5.5, figures are quoted in a third unit, namely GWh, in order to show the link between fuel use and electricity generated[4] as well as showing generation from conventional steam stations and from combined cycle gas turbine stations over the most recent five years.

5.23 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.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

5.24 Fuel used in 2013 fell 2.5 per cent, from 78.2 million tonnes of oil equivalent (mtoe) to 76.3 mtoe, with, coal use down by 8 per cent, and gas use down by 6 per cent.

5.25 Total electricity generated (including pumped storage) in the United Kingdom in 2013 was 359 TWh, a decrease of 1.2 per cent on the 363 TWh in 2012. Major power producers (MPPs, as defined in paragraph 5.67) accounted for 90 per cent of electricity generation in 2013. Generation by MPPs was down 1.4 per cent on 2012, at 324 TWh, while generation by other generators was 0.7 per cent up on a year earlier, at 35 TWh.

5.26 Generation from gas fell by 4.5 per cent, from 100 TWh in 2012 to 96 TWh in 2013, the lowest level since 1996. This was mainly due to high gas prices, particularly relative to coal, making it comparatively more expensive to generate, as well as greater generation from renewables. As a result, several stations have been running at low levels or were closed or mothballed during 2013 (see Table 5C). In 2013, generation from coal decreased 8.7 per cent, from 143 TWh in 2012 to 131 TWh. Generation by coal in the 'Other Generators' sector saw a large fall in 2013, this was mainly due to Lynemouth power station being re-classified as a Major Power producer.

5.27 In 2013 there was a 0.3 per cent increase in generation from nuclear, from 70 TWh to 71 TWh the highest level since 2006. This was following an 11 per cent increase in 2011 and then a 2.1 per cent increase in 2012, after extensive maintenance outages in 2010 (particularly to Sizewell B which was offline for six months).

5.28 In 2013, generation from oil continued to fall, to 2.1 TWh, a 17 per cent reduction on 2012, and its lowest level in at least the last seventeen years, and a fall of 4.6 TWh on 2008's ten year high.

5.29 Generation by all renewable sources[5] rose 30 per cent, to 54 TWh, between 2012 and 2013. The increased capacity in 2013 resulted in overall wind and solar generation [6] increasing by 45 per cent to 30 TWh. With rainfall levels in catchment areas during 2013 around 9 per cent lower than 2012, hydro generation decreased by 11.1 per cent, from 5.3 TWh to 4.7 TWh. Over the same period, generation from bio-energy (including biodegradable wastes) rose 24 per cent to 18 TWh, despite the closure of Tilbury in 2013 after converting from a coal power station to biomass in 2011.[7] More information on renewable electricity can be found in Chapter 6.

5.30 Table 5.5 also shows electricity supplied data, which deducts stations' own use of electricity from its generation. These data take into account the fact that some stations use relatively more electricity than others in the generation process itself. In total, gross electricity supplied in 2013 was

[4] Conversion factors for switching between mtoe, GWh and other units of energy can be found on page 231 and inside back cover flap.

[5] Renewables includes wind, natural flow hydro, solar, wave, tidal and bioenergy (including co-firing).

[6] Including generation from wave and tidal.

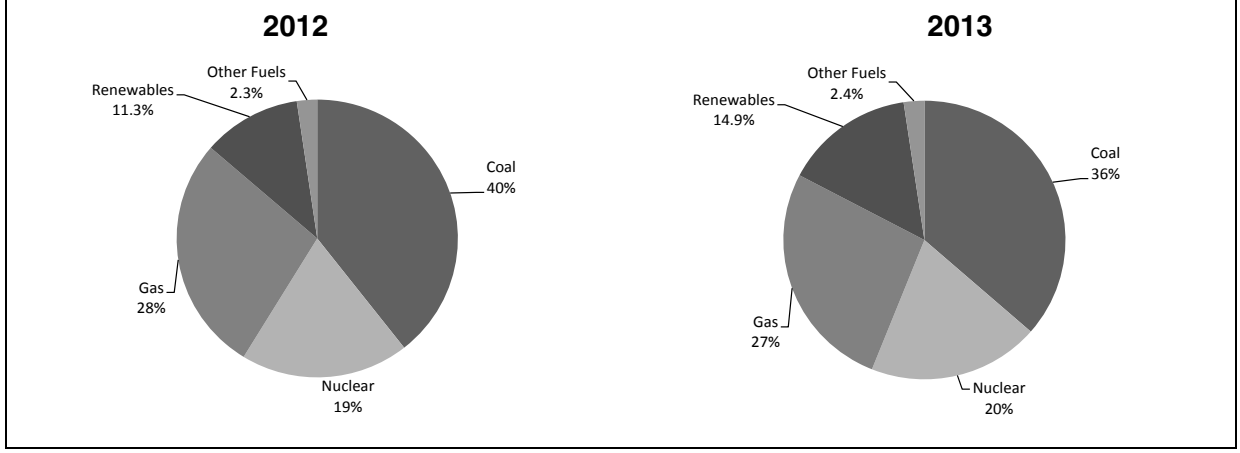
[7] For consistency with the Renewables chapter (Chapter 6), non-biodegradable wastes (previously included in thermal renewables / bio-energy) have been moved to the 'other fuels' category for 2007 onwards. Prior to this, they remain in thermal renewables.

1.2 per cent less than in 2012, at 341 TWh. For gas-fired stations it was 4.5 per cent less, for coal it was 8.7 per cent less, while for nuclear stations it was 0.3 per cent more.

5.31 Chart 5.2 shows the shares of 2013 generation by fuel, on an output basis (i.e. the percentage of electricity generated by the fuel), compared with 2012. Further information on this, and the alternative, input basis, of comparing fuel use, can be found in paragraphs 5.74 to 5.75

5.32 Gas's share of generation in 2013, at 27 per cent, was 1 percentage point lower than in 2012. Coal's share, at 36 per cent, was 3 percentage points less than in 2012. Nuclear's 20 per cent share was less than 0.5 percentage point up from 2012. Renewables' share increased from 11 per cent in 2012 to a new record 15 per cent in 2013. Other fuels, including oil and pumped storage, increased from 2.3 per cent in 2012 to 2.4 per cent in 2013.

Chart 5.2: Shares of electricity generation, by fuel



Relating measurements of supply, consumption and availability (Table 5.4)

5.33 Table 5.4 shows the relationship between these terms for the latest five years. For the full definitions of the terms used in the commodity balances see Annex A, paragraphs A.7 to A.42.

Plant capacity (Tables 5.6, 5.7 and 5.8)

5.34 Table 5.6 shows capacity, i.e. the maximum power available at any one time, for major power producers and other generators by type of plant. From 2006 onwards, major power producers (MPPs) capacities are measured in Transmission Entry Capacity (TEC) terms, rather than Declared Net Capacity (DNC) [8].

5.35 In 2013, total capacity of all generators was 84,991 MW, down 4.9 per cent from the 89,415 MW installed at the end of 2012. Major Power Producers, fell by 5,368 MW, from 81,873 MW to 76,505 MW. Just over half of this decrease was a result of reduced capacity at coal fired power stations, mainly from the closure of Cockenzie and Tilbury B. A further 36 per cent was due to the closure of Didcot A, which was running on both coal and gas. After an increase of 1,036 MW in 2012, wind capacity (de-rated, see paragraph 5.79) increased by a further 629 MW, with many new sites opening. As noted above, the past four years have seen the closure, capacity reduction, full or partial mothballing, or conversion to biomass, of several large power stations. These are summarised in table 5C below.

[8] The effect of this change has been to increase the capacity of MPPs by about 2,000 MW in total. A full definition of TEC and DNC is given in paragraph 5.79. Wind, small scale hydro, and solar photovoltaics DNC is de-rated to take into account intermittency. Renewables installed capacity figures are given in table 6.4.

Table 5C: Major Power Producers capacity closed, converted or reduced (as at end of May 2014), since end-2010

Site	Fuel	Status	Previous Capacity (MW)	New Capacity (MW)	Year of closure, capacity reduction or conversion
Fife	CCGT	Closed	123	0	2011
Derwent	CCGT-CHP	Closed	228	0	2012
Shotton	CCGT-CHP	Closed	210	0	2012
Kingsnorth A	Coal/Oil	Closed	1,940	0	2012
Grain A	Oil	Closed	1,300	0	2012
Oldbury	Nuclear [1]	Closed	434	0	2012
Wylfa (Reactor 1)	Nuclear [2]	Partially Closed	980	490	2012
Keadby	CCGT	Mothballed	749	0	2013
Kings Lynn	CCGT	Mothballed	340	0	2013
Roosecote	CCGT	Mothballed	229	0	2013
Cockenzie	Coal	Closed	1,152	0	2013
Drax	Coal [3]	Partially Converted	3,870	3,870	2013
Ironbridge	Coal [4]	Converted	940	360	2013
Tilbury B	Coal [5]	Closed	750	0	2013
Didcot A	Coal/Gas	Closed	1,958	0	2013
Fawley	Oil	Closed	1,036	0	2013
Teesside	OCGT [6]	Closed	45	0	2013
Ferrybridge C	Coal [7]	Partially Closed	1960	980	2014
Uskmouth	Coal [8]	Closed	363	0	2014

1. Reactor 2 with capacity of 217 MW closed on 30 June 2011, reactor 1 with capacity of 217 MW closed on 29 February 2012

2. Reactor 2 with a capacity of 490 MW closed on 30 April 2012

3. Partly converted to biomass. Overall capacity remains at 3,870 MW (coal 3,225 MW, biomass 645 MW)

4. Converted from coal to dedicated biomass in 2013 (at 900 MW), before reducing to 360 MW in April 2014.

5. Converted from coal at 1,063 MW capacity to dedicated biomass at 750 MW capacity in 2011 before closing in 2013.

6. Reduced capacity from 1,875 MW (CCGT 1,830 MW / OCGT 45 MW) to 45 MW (OCGT) in 2011 before closing in 2013.

7. Two units (980 MW) closed in April 2014.

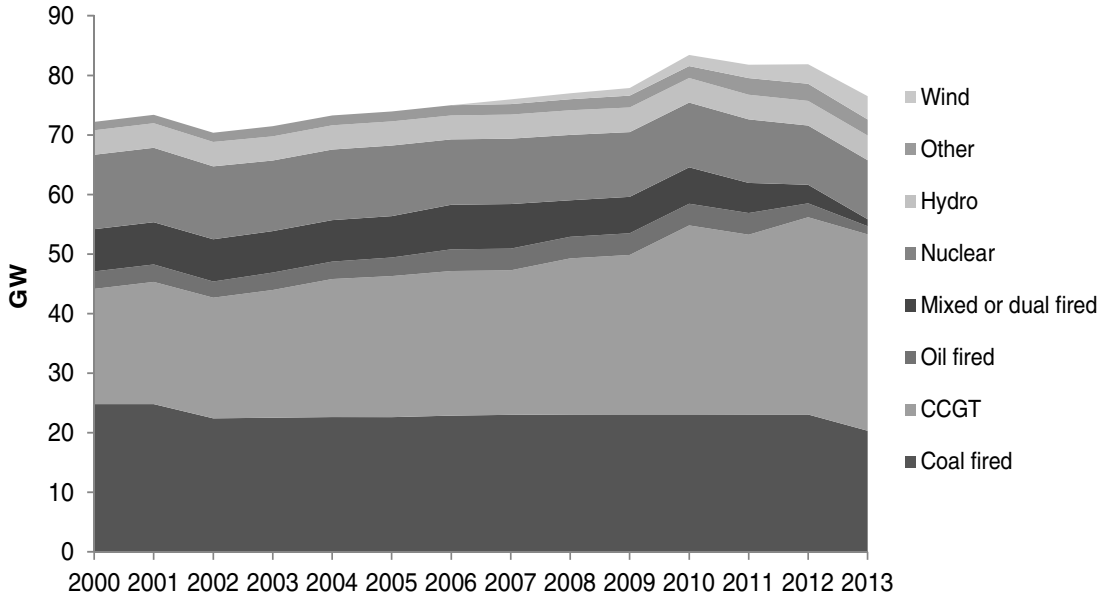
8. One unit (120 MW) closed in April 2013, with the remaining two closing in April 2014.

5.36 At the end of 2013, MPPs accounted for 90 per cent of the total generating capacity, unchanged from the previous four years. The capacity of other generators increased by 944 MW (13 per cent), with a 1,380 MW increase in capacity from renewables other than hydro and wind [9] offset by a net 436 MW decrease in conventional steam and CCGT stations. A breakdown of the capacity of the MPPs' plants at the end of December each year from 2000 to 2013 is shown in Chart 5.3.

5.37 Table 5.7 separates the capacities of MPPs geographically to show England and Wales, Scotland and Northern Ireland. In 2013, 81 per cent of the generating capacity in the UK owned by MPPs were in England and Wales, 15 per cent was in Scotland and 4 per cent in Northern Ireland. Out of the net decrease in UK capacity of 5,368 MW between 2012 and 2013, 6,596 MW was in England and Wales, with Scotland and Northern Ireland showing a net increase of 1,229 MW.

[9] Approximately 64 MW of this increase is due to solar photovoltaic capacity installed under the Feed in Tariff (FiT) scheme. For further information on FiTs, see paragraph 6.18.

Chart 5.3: Generating capacity of major power producers 2000-2013



1. 'Other' includes: Gas turbines, oil engines and renewables other than hydro.
2. 'Hydro' includes Natural flow and pumped storage.
3. 'Mixed or dual fired' includes non-CCGT stations that can be fuelled by a combination of gas, coal and oil
4. Wind included from 2007

5.38 In Table 5.8, data for the generating capacity for generators other than MPPs are shown according to the industrial classification of the generator. For CHP, schemes are 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). In 2013, the chemicals sector and the oil and gas terminals and oil refineries sector each had 12 per cent of capacity, while engineering and other metal trades had a 3 per cent share and paper, printing and publishing and food, drink and tobacco had a combined share of 11 per cent. In 2013, 57 per cent of capacity was in the commercial and domestic sectors, an 11 percentage points increase on a year earlier.[10]

5.39 In addition to tables 5.6-5.8, table 5.12, showing installed capacity, disaggregated by connection type (high voltage or low voltage) and technology, can be found on DECC's energy statistics website, at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

Plant loads, demand and efficiency (Table 5.9)

5.40 Table 5.9 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. With the advent of BETTA (see paragraph 5.53), England, Wales and Scotland are covered by a single network and a single maximum load is shown for Great Britain for 2006 to 2013.

5.41 Maximum load (demand) in the UK during the winter of 2013/2014 occurred on 25 November 2013. At 53,420 MW, this was 7.1 per cent lower than the previous winter's maximum on 12 December 2012. In 2013/14, the maximum load in Great Britain occurred on 25 November 2013 at the half hour period ending 17:30 (51,811 MW). However, in Northern Ireland the maximum load occurred on 14 January 2014 at the period ending 17:30 (1,691 MW), which was 2.0 per cent below that of the previous winter. In Great Britain the highest ever load met was 60,118 MW on 10 December 2002.

[10] The total capacity of 'Other Generators' fell in 2007 as, from this point, the capacity of major wind farm operators are included under MPPs (see paragraph 5.68). In 2008, Shotton CHP plant was re-classified as a MPP as the electricity generated is now exported to the grid rather than for use in the nearby paper mill. This change in classification led to a fall in capacity in the paper, printing and publishing sector.

5.42 Maximum demand in 2013/2014 was 70 per cent of the UK capacity of major power producers (MPPs) (as shown in Table 5.6) as measured at the end of December 2013, unchanged on 2012/2013.

5.43 In Great Britain, maximum demand in December 2013 was 70 per cent of the England, Wales and Scotland capacity of MPPs (Table 5.7) unchanged on that for winter 2012/13. For Northern Ireland, the proportion was 54 per cent (71 per cent in 2011/12). These percentages do not include the capacities available via the interconnectors with neighbouring grid systems nor demand for electricity via these interconnectors.

5.44 Plant load factors measure how intensively each type of plant has been used. The load factor of nuclear stations in 2012 at 74 per cent was 3.1 percentage points higher than in 2012, due to increased availability of stations. However, it was 6.3 percentage points below the peak load factor of 80.1 per cent in 1998. With generation from gas at its lowest level since 1996, the CCGT load factor fell to a record low of 28 per cent. This was following reductions in each year since 2009, from 2008's eight-year high of 71.0 per cent. Between 2012 and 2013, the load factor for coal fired power stations increased by 1.5 percentage points, to 58 per cent.

5.45 Load factors for natural flow hydro and wind (as well as other renewables) can be found in table 6.5[11]. Slightly higher wind speeds in 2013 resulted in an increase in the overall wind load factor (on an unchanged configuration basis) of 3.1 percentage points, from 29 per cent in 2012 to 32 per cent in 2013. Onshore wind rose from 26 per cent to 29 per cent, while offshore wind increased from 36 per cent to 39 per cent, higher than the load factor for CCGT stations in 2013. Rainfall (in the main hydro areas) fell in the first three quarters of 2013 compared to 2012, leading to a fall in the hydro load factor (on an unchanged configuration basis) of 4.1 percentage points, from 36 per cent to 32 per cent in 2013.[12] Pumped storage use is less affected by the dry weather and the load factor fell successively from 2009 to 2011, from 2008's peak, as lower peak time demand for electricity and lower prices deterred its use. In 2013, the load factor decreased by 0.3 percentage points, to 12 per cent.

5.46 Thermal efficiency measures the efficiency with which the heat energy in fuel is converted into electrical energy. An increase in new, more efficient, CCGT capacity in 2010 resulted in an increase to the overall thermal efficiency of these stations of one percentage point in each of 2010 and 2011, to a record high of 48.5 per cent. However, this dropped to 47.7 per cent in 2012 but increased again to 48.4 per cent in 2013. Since the closure of older, less efficient stations in 2006, the efficiency of nuclear stations increased to a local peak in 2009 of 39.0 per cent. However, in 2010, as was the case in 2008, maintenance outages counteracted these efficiency gains, with the efficiency falling to 38.4 per cent. After falling further in 2011, the efficiency increased to a record 39.8 per cent in 2012, decreasing by 0.5 percentage points to 39.3 per cent in 2013. The efficiencies presented here are calculated using **gross** calorific values to obtain the energy content of the fuel inputs. [13]

[11] The load factors presented in table 5.9 use transmission entry capacity (as presented in table 5.6). For hydro and wind, this has been de-rated for intermittency, so is not suitable for calculating load factors. The installed capacity measure used in Chapter 6 has not been de-rated.

[12] For renewables load factors, including the unchanged configuration and standard (average beginning and end of year) measures, see table 6.5

[13] For more information on gross and net calorific values, see paragraph 5.81

Power stations in the United Kingdom (Tables 5.10 and 5.11)

5.47 Table 5.10 lists the operational power stations owned by Major Power Producers in the United Kingdom as at the end of May 2014, along with their installed capacity and the year they began to generate electricity. Where a company operates several stations they are grouped together.

5.48 Table 5.11 shows CHP schemes of 1 MW and over for which the information is publicly available. However, 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 7), since CHPQA information for individual sites is not publicly available.

5.49 In Table 5.10, generating stations using renewable sources are also listed in aggregate form in the "Other power stations" section apart from hydro, wind and biomass/waste stations operated by the major power producers, which appear in the main table. For completeness, CHP stations not appearing in the main table are included in aggregate in this section. Details of the interconnectors between England and France, England and the Netherlands, Scotland and Northern Ireland, Northern Ireland and the Irish Republic, and Wales and the Irish Republic are also given in this table. The total installed capacity of all the power stations individually listed in Table 5.10 is 81,955 MW. [14]

Carbon dioxide emissions from power stations

5.50 It is estimated that carbon dioxide emissions from power stations accounted for 33 per cent of the UK's total carbon dioxide emissions in 2013. Emissions vary by type of fuel used to generate the electricity and emission estimates for all electricity generation for 2011 to 2013 are shown in Table 5D below.

Table 5D: Estimated carbon dioxide emissions from electricity supplied 2011 to 2013 [1,2]

Fuel	Emissions (tonnes of carbon dioxide per GWh electricity supplied)		
	2011	2012	2013 [3]
Coal	906	906	907
Gas	390	400	395
All fossil fuels	613	706	701
All fuels (including nuclear and renewables)	440	487	454

1. The carbon intensity figures presented in Table 5D are different to those produced for the Greenhouse Gas Inventory (GHGI). The differences arise due to slightly differing methodologies, including geographical coverage and treatment of autogenerators but principally because the GHGI presents figures based on a 5-year rolling average whereas those in Table 5A are presented as single year figures.

2. The numerator includes emissions from power stations, with an estimate added for auto-generation. The denominator (electricity supplied by all generators) used in these calculations can be found in table 5.5, with the figure for All fuels in 2013 being 337,333 GWh.

3. The 2013 emissions figures are provisional.

Sub-national electricity data

5.51 The collection of data relating to regional and local consumption of electricity began in 2004. For details of the availability of local level electricity (and gas) data see Chapter 4, paragraph 4.17 and the sub-national electricity statistics pages of the DECC energy statistics website: www.gov.uk/government/collections/sub-national-electricity-consumption-data. A summary of electricity consumption at regional level is given in Table 5E and relates to 2012. The regional data will not sum exactly to the figures given in table 5.4 as the regional data are not based exactly on a calendar year and are obtained via different data sources.

[14] The total installed capacity for stations listed in table 5.10 differs from the total in table 5.6, as the latter is on a Transmission Entry Capacity basis, and taken as at the end of 2013. See paragraph 5.78 for more information on the measures of capacity.

Table 5E: Electricity sales 2012

	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	13,267	3,421	27,722	399	40,989
South East	16,284	3,737	22,904	331	39,188
North West	12,177	3,145	20,500	236	32,676
Scotland	10,922	2,750	15,085	211	26,007
East of England	11,128	2,562	15,881	216	27,010
West Midlands	9,605	2,381	14,707	194	24,312
South West	10,464	2,445	13,962	247	24,426
Yorkshire and the Humber	8,742	2,344	14,910	180	23,652
East Midlands	7,873	1,991	12,840	157	20,713
Wales	5,230	1,381	10,055	124	15,285
North East	4,138	1,197	7,448	81	11,585
Unallocated Consumption	220	62	4,801	24	5,021
Great Britain	110,050	27,416	180,815	2,400	290,864
Northern Ireland [2]					7,935
Sales direct from high voltage lines [3]					4,382
Total					303,181

1. Figures are the number of Meter Point Administration Numbers (MPANs); every metering point has this unique reference number.
2. Northern Ireland data are based on data for electricity distributed provided by Northern Ireland Electricity
3. Based on estimate provided by Ofgem.

5.52 By the end of December 2013, over 60 per cent of customers were no longer with their home supplier. Table 5F gives market penetration in more detail, by distribution areas of the former public electricity suppliers supplied by the largest of the UK's energy companies. Data on the share of supply by the smaller companies are not currently available so the table has not been adjusted for the survey coverage. For all types of domestic customer, it is in the markets in North Scotland, South Wales and the North East of England that new suppliers have had most success. As of the end of 2013, the share of the market not supplied by the home supplier stood at 56 per cent of the credit market, 67 per cent of the direct debit market, and 62 per cent of the pre-payment market.

Table 5F: Domestic electricity market penetration (in terms of percentage of customers supplied) by Public Electricity Supply area and payment type, fourth quarter of 2013

	Home Supplier			Non-Home Supplier		
Region	Credit	Direct Debit	Prepayment	Credit	Direct Debit	Prepayment
West Midlands	37	25	26	63	75	74
North West	39	24	32	61	76	68
Yorkshire	38	26	24	62	74	76
North East	37	28	23	63	72	77
Eastern	44	26	30	56	74	70
East Midlands	42	28	36	58	72	64
South East	42	33	35	58	67	65
Merseyside and North Wales	40	31	40	60	69	60
South West	45	34	41	55	66	59
London	44	37	42	56	63	58
Southern Scotland	45	39	53	55	61	47
Southern	57	44	48	43	56	52
South Wales	63	50	63	37	50	37
Northern Scotland	74	61	70	26	39	30
Great Britain	44	33	38	56	67	62

Structure of the industry

5.53 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.

5.54 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 flotations. At the end of 2013, there were 37 major power producers operating in Great Britain. 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 5.52 and Table 5F give more details of the opening up of the domestic gas and electricity markets to competition.

5.55 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. The transmission system is linked to continental Europe via an interconnector to France under the English Channel, and since 1 April 2011, to the Netherlands under the North Sea (see Table 5.10). Up to March 2005, the Scottish transmission system was regarded as being linked to that in England and Wales by two interconnectors but under BETTA National Grid also took on responsibility for operating the system in Scotland, to form a single Great Britain transmission network.

5.56 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.

5.57 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. In July 2012, an interconnector between the Irish Republic and Wales began operations.

5.58 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.

Comparisons of electricity in the European Union in 2012[15]

5.59 The European Union (EU) as a whole generated 3,281 TWh of electricity in 2012. Of this, 11 per cent was generated in the UK. Germany generated the largest share of electricity in the EU, with 19 per cent. Industry had 36 per cent of EU final electricity consumption, households 30 per cent, services 30 per cent and, transport 2 per cent.

5.60 In 2012, the largest sources of the EU's generation were coal and nuclear, each with a share of 27 per cent of total generation and gas 18 per cent. France sources the largest share of its generation from nuclear, with 75 per cent, while 38 per cent of Sweden's electricity is from nuclear. The largest shares of coal in the generation mix are in Germany (with over half coming from lignite/brown coal), with 44 per cent, and UK, with 39 per cent. Italy and Spain source most of their electricity from gas, with 43 per cent and 25 per cent of generation respectively in 2012.

5.61 Renewables represented 24 per cent of the EU's generation. Sweden sources 59 per cent of its electricity from renewables (mainly hydro, but also 7 per cent from biomass). Denmark's 48 per cent renewables share comes from wind (33 per cent) and biomass (14 per cent), the highest share of generation from wind in the EU. Spain's 30 per cent renewables share comes mainly from wind (17 per cent) and hydro (8 per cent). Italy had 32 per cent of its generation from renewables, with Germany and France 24 per cent and 16 per cent respectively.

5.62 Sweden's exports, net of imports, were 12 per cent of its generation in 2012, making it the highest net exporter of electricity. For Denmark, however, net imports represented 17 per cent of its electricity requirements, making it the highest net importer.

[15] At the time of writing, the latest available data were for 2012. Data from Eurostat, at: http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/introduction

The Electricity Supply System in Great Britain in 2013

This map has been adapted from a map provided by Reed Business Publishing and National Grid; it is available in colour on the DECC website. Wind farms are now shown on the map in the Renewables chapter.

Technical notes and definitions

5.63 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 1.29 to 1.62. 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 five years, these notes also cover data for earlier years that are available on the DECC energy statistics web site.

Electricity generation from renewable sources

5.64 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 6.

Combined heat and power

5.65 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 7.

Generating companies

5.66 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 MPP. Additionally (and particularly since 2010), this category includes generation from the domestic sector.

5.67 The definition of MPPs was amended in 2008 to include major wind farm companies, but this change only applies to data for 2007 onwards. 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.

5.68 Major wind farm operators have been included under MPPs, for 2007 onwards, in the monthly, quarterly, and annual tables of electricity statistics produced by DECC. Until then, all generation using wind turbines was 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.

5.69 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 50 MW will be asked to provide monthly data for generation from wind and thus be included in the list of MPPs.

5.70 The inclusion of major wind farm operators under MPPs 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 onwards.

5.71 **Major power producers at the end of 2013 were:**
AES Electric Ltd, Baglan Generation Ltd, Barking Power Ltd, British Energy plc, Centrica Energy, CEP Wind 2 Ltd, Coolkeeragh ESB Ltd, Corby Power Ltd, DONG Energy UK Ltd, Drax Power Ltd, E.On

UK, EDF Energy, Eggborough Power Ltd, Energy Power Resources, Falck Renewables Ltd, Fred Olsen, GDF Suez, Infinis, Intergen, International Power, LondonWaste Ltd, Magnox Ltd, Peel Energy Ltd, Px Ltd, RES Ltd, Riverside Resources Recovery Ltd, RWE Npower plc, Scottish and Southern Energy plc, Scottish Power plc, Semcorp Utilities (UK) Ltd, SELCHP Ltd, Statkraft Energy Ltd, Statkraft Wind UK Ltd, Sutton Bridge Power Generation, Third Energy Trading Ltd, Vattenfall Wind Power, VPI Immingham LLP.

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

CEP Wind 2 Ltd, Dong Energy, Falck, Fred Olsen, GDF Suez, HG Capital, Infinis, Peel, Renewable Energy Systems, Statkraft Wind UK Ltd, Vattenfall Wind Power.

Generation from wind farms owned or operated by the following MPPs that had previously been excluded from the MPP category are now included for 2007 onwards:

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

Types of station

5.73 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.

Electricity supplied – input and output basis

5.74 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

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

5.75 Figures on fuel use for electricity generation can be compared in two ways. Table 5.3 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 (e.g. 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 four percentage points in 2013) compared with the fuel input basis. This is because of the higher conversion efficiency of gas.

Public distribution system

5.76 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

5.77 The various sectors used for sales and consumption analyses are standardised across all chapters of the 2014 Digest. For definitions of the sectors see Chapter 1 paragraphs 1.56 to 1.60 and Annex A paragraphs A.31 to A.42.

Losses

5.78 The losses component of electricity demand are calculated as follows:
Transmission losses: electricity lost as a percentage of electricity entering the GB transmission system (as reported by National Grid); this is applied to the electricity available figure in DUKES 5.4 (351,764 GWh in 2013).
Distribution losses: electricity lost in distribution as a percentage of electricity entering the distribution system (as reported by the distribution network operators); this is applied to electricity available less transmission losses.
Theft: a fixed percentage of 0.3 per cent is assumed to be stolen from the distribution network. This is applied to electricity available less transmission losses.

Transmission Entry Capacity, Declared Net Capacity and Installed Capacity

5.79 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. DNC 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.

5.80 DNC is used to measure the maximum power available from generating stations that use renewable resources. For wind and wave and small scale hydro a factor is applied to declared net capability to take account of the intermittent nature of the energy source (e.g. 0.43 for wind, 0.365 for small scale hydro and 0.17 for solar photovoltaics). Further information on this can be found in paragraph 6.115, and at: www.legislation.gov.uk/uksi/1990/264/made?view=plain

Load factors

5.81 The following definitions are used in Table 5.9:

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 transmission network at any one time, net of demand met by generation connected to the distribution network. From 2005 (following

the introduction of BETTA – see paragraph 5.53) 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.

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

5.82 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 7, paragraph 7.23 and 7.24 and Table 7D. 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

5.83 Until 2004, figures for the MPPs 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 – 2013:	12 months ended 31 December

5.84 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
	53 weeks ended
2009	2 January 2010
	52 weeks ended
2010	1 January 2011
2011	31 December 2011
2012	29 December 2012
2013	28 December 2013

Monthly and quarterly data

5.85 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.gov.uk/government/collections/electricity-statistics. Monthly data on fuel used in electricity generation by MPPs 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, electricity generated, and electricity supplied by all generators (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

5.86 For MPPs, as defined in paragraphs 5.66 to 5.68, 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 and sales of electricity (where a generator also supplies electricity).

5.87 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. A further means of checking electricity consumption data is now being employed on data for 2006 and subsequent years. A monthly inquiry is sent to electricity distributors, as well as the National Grid, to establish electricity distribution and transmission losses. Copies of the survey questionnaires are available in *electricity statistics: data sources and methodologies*, at:
www.gov.uk/government/collections/electricity-statistics.

5.88 A sample of companies that generate electricity mainly for their own use (known as autogenerators or autoproducers – see paragraph 5.66, 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 7 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.

5.89 In addition to the above sources, some administrative data is used for renewable generation and capacity in the hands of non major power producers- this includes data from the Renewables Obligation and Feed in Tariff schemes.

Statistical differences

5.90 Statistical differences are included in Tables 5.1 and 5.2. 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 5.82 and 5.83, above. Sales data based on calendar years will always have included more electricity consumption than the slightly shorter statistical year of exactly 52 weeks.

5.91 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 2013, for about three 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

	2009	2010	2011	2012	2013
Total electricity					
Supply					
Production	373,033r	378,556r	364,346r	360,439r	356,253
Other sources *(1)*	3,685	3,150	2,906	2,966	2,898
Imports	6,609	7,144	8,689	13,742r	17,533
Exports	-3,748	-4,481	-2,467	-1,871r	-3,103
Marine bunkers	-	-	-	-	-
Stock change	-	-	-	-	-
Transfers	-	-	-	-	-
Total supply	**379,579r**	**384,370r**	**373,473r**	**375,277r**	**373,581**
Statistical difference *(2)*	+79r	-482r	-846r	-923r	-173
Total demand	**379,500r**	**384,853r**	**374,319r**	**376,200r**	**373,755**
Transformation	-	-	-	-	-
Energy industry use	**29,683r**	**28,992r**	**28,304r**	**29,458r**	**29,455**
Electricity generation	16,569r	16,106r	16,414r	17,946r	17,888
Oil and gas extraction	594	563	576	565	570
Petroleum refineries	4,519	5,034	4,684	4,118r	4,203
Coal extraction and coke manufacture	1,018	1,040	929	902	873
Blast furnaces	464	297	253	369	440
Patent fuel manufacture	-	-	-	-	-
Pumped storage	4,843	4,212	3,843	3,978	3,930
Other	1,676	1,740	1,603	1,581r	1,551
Losses	**28,069r**	**27,032r**	**28,129r**	**28,911r**	**27,000**
Final consumption	**321,748**	**328,829r**	**317,886r**	**317,831r**	**317,300**
Industry	**99,738**	**104,522r**	**102,360r**	**97,813r**	**98,007**
Unclassified	-	-	-	-	-
Iron and steel	3,615	3,842	3,852r	3,376r	3,803
Non-ferrous metals	6,075	6,726	6,971	5,028r	4,430
Mineral products	7,010	7,266	7,010	6,747r	6,726
Chemicals	17,702	18,454	17,637	17,068r	17,277
Mechanical engineering, etc	7,688	7,653	7,261	7,072r	7,065
Electrical engineering, etc	6,455	6,657	6,383	6,189r	6,172
Vehicles	5,012	5,284	5,188	5,081r	5,065
Food, beverages, etc	10,741	11,520	11,319	11,126r	11,060
Textiles, leather, etc	3,013	3,050	2,992	2,910r	2,894
Paper, printing, etc	11,069	10,954	10,904	10,861r	11,020
Other industries	19,771	21,496r	21,304r	20,863r	21,033
Construction	1,586	1,621	1,539	1,494r	1,464
Transport *(3)*	**4,040**	**4,076**	**4,084r**	**4,097r**	**4,109**
Air	-	-	-	-	-
Rail *(4)*	4,022	4,058	4,063r	4,076r	4,076
Road *(5)*	18	18	21	21r	33
National navigation	-	-	-	-	-
Pipelines	-	-	-	-	-
Other	**217,970**	**220,231r**	**211,441r**	**215,921r**	**215,184**
Domestic	118,541	118,841r	111,604r	114,764r	113,453
Public administration	19,442	19,101	18,396	18,913r	18,822
Commercial	76,187	78,261r	77,494r	78,372r	79,035
Agriculture	3,801	4,029	3,948	3,871	3,874
Miscellaneous	-	-	-	-	-
Non energy use	-	-	-	-	-

5.1 Commodity balances (continued)

Electricity

GWh

	2009	2010	2011	2012	2013
Electricity production					
Total production *(6)*	**373,033r**	**378,556r**	**364,346r**	**360,439r**	**356,253**
Primary electricity					
Major power producers	**79,932r**	**72,984**	**86,250**	**91,544r**	**98,047**
Nuclear	69,098	62,140	68,980	70,405	70,608
Large scale hydro *(6)*	4,029	2,505	4,291	3,898	3,348
Small scale hydro	265	198	303	272	261
Wind *(7)*	6,540r	8,141	12,675	16,970r	23,830
Other generators	**3,700r**	**2,945r**	**4,131r**	**5,160r**	**7,734**
Nuclear	-	-	-	-	-
Large scale hydro	635	587	698	733	678
Small scale hydro	302r	277r	390r	382r	412
Wind, wave and solar photovoltaics *(7)*	2,764r	2,081r	3,042r	4,045r	6,645
Secondary electricity					
Major power producers	**258,394**	**271,651**	**243,157**	**233,681**	**222,759**
Coal	99,287	103,941	104,797	140,164	130,204
Oil	3,839r	2,271r	1,074	1,132r	745
Gas	152,598	161,748r	132,753	86,229	82,405
Renewables	2,670r	3,691r	4,533	6,156r	9,405
Other	-	-	-	-	-
Other generators	**31,007r**	**30,976r**	**30,809r**	**30,054r**	**27,713**
Coal	3,751	3,753	3,774	2,992r	564
Oil	2,155	2,532	2,043	1,439r	1,391
Gas	13,901	13,908	13,767	13,929r	13,207
Renewables	8,004r	8,305r	8,565r	8,757r	9,089
Other	3,196	2,478	2,660r	2,937r	3,462
Primary and secondary production *(8)*					
Nuclear	69,098	62,140	68,980	70,405	70,608
Hydro	5,231r	3,568r	5,682r	5,285r	4,698
Wind, wave and solar photovoltaics	9,304r	10,222r	15,718r	21,015r	30,475
Coal	103,038	107,694	108,571	143,156r	130,768
Oil	5,995r	4,803r	3,117	2,571r	2,135
Gas	166,499	175,656r	146,520	100,158r	95,612
Other renewables	10,674r	11,996r	13,098r	14,913r	18,494
Other	3,196	2,478	2,660r	2,937r	3,462
Total production	**373,033r**	**378,556r**	**364,346r**	**360,439r**	**356,253**

(1) Pumped storage production.
(2) Total supply minus total demand.
(3) From 2004, non-traction Transport sector consumption is included under 'Transport Services'.
(4) From 2004, this includes light rail and metro systems (eg. London Underground).
(5) Included from 2004.
(6) Excludes pumped storage production.
(7) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.68.
(8) These figures are the same as the electricity generated figures in Table 5.5 except that they exclude pumped storage production. Table 5.5 shows that electricity used on works is deducted to obtain electricity supplied. It is electricity supplied that is used to produce Chart 5.2 showing each fuel's share of electricity output (see paragraph 5.31).

5.2 Commodity balances

Public distribution system and other generators

GWh

	2011			2012			2013		
	Public distribution system	**Other generators**	**Total**	**Public distribution system**	**Other generators**	**Total**	**Public distribution system**	**Other generators**	**Total**
Supply									
Major power producers	329,406	-	329,406	325,225r	-	325,225r	320,806	-	320,806
Other generators	-	34,939r	34,939r	-	35,214r	35,214r	-	35,447	35,447
Other sources *(1)*	2,906	-	2,906	2,966	-	2,966	2,898	-	2,898
Imports	8,689	-	8,689	13,742r	-	13,742r	17,533	-	17,533
Exports	-2,467	-	-2,467	-1,871r	-	-1,871r	-3,103	-	-3,103
Transfers	15,059r	-15,059r	-	16,129r	-16,129r	-	14,979	-14,979	-
Total supply	**353,593r**	**19,880r**	**373,473r**	**356,192r**	**19,085r**	**375,277r**	**353,113**	**20,468**	**373,581**
Statistical difference *(2)*	-883r	37r	-846r	-958r	35r	-923r	-193	20	-173
Total demand	**354,476r**	**19,843r**	**374,319r**	**357,150r**	**19,050r**	**376,200r**	**353,306**	**20,448**	**373,755**
Transformation	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Energy industry use	**22,592**	**5,712r**	**28,304r**	**24,033r**	**5,425r**	**29,458r**	**23,608**	**5,847**	**29,455**
Electricity generation	14,480	1,934r	16,414r	15,868r	2,078r	17,946r	15,620	2,268	17,888
Oil and gas extraction	576	-	576	565	-	565	570	-	570
Petroleum refineries	1,357	3,328	4,684	1,338	2,780r	4,118r	1,291	2,913	4,203
Coal extraction and coke manufacture	847	82	929	825	77	902	796	78	873
Blast furnaces	-	253	253	-	369	369	-	440	440
Pumped storage	3,843	-	3,843	3,978	-	3,978	3,930	-	3,930
Other fuel industries	1,489	115	1,603	1,460	121r	1,581r	1,402	150	1,551
Losses	**28,119r**	**10r**	**28,129r**	**28,896r**	**15r**	**28,911r**	**26,978**	**22**	**27,000**
Transmission losses	6,467r		6,467r	6,755r		6,755r	6,353		6,353
Distribution losses	20,612r	10r	20,622r	21,100r	15r	21,116r	19,588	22	19,610
Theft	1,040r		1,040r	1,040r		1,040r	1,037		1,037
Final consumption	**303,765**	**14,121r**	**317,886r**	**304,221**	**13,610r**	**317,831r**	**302,720**	**14,580**	**317,300**
Industry	**91,796**	**10,565r**	**102,360r**	**89,313**	**8,499r**	**97,813r**	**89,444**	**8,563**	**98,007**
Iron and steel	3,167	684r	3,852r	2,807r	568r	3,376r	2,960	843	3,803
Non-ferrous metals	3,936	3,035	6,971	3,888r	1,140r	5,028r	3,875	554	4,430
Mineral products	6,916	94	7,010	6,641r	106r	6,747r	6,627	99	6,726
Chemicals	14,854	2,783	17,637	14,639r	2,429r	17,068r	14,650	2,627	17,277
Mechanical engineering etc	7,163	241	7,404	6,970r	245r	7,215r	6,955	266	7,221
Electrical engineering etc	6,377	-	6,377	6,184r	-	6,184r	6,166	-	6,166
Vehicles	5,053	-	5,053	4,942r	-	4,942r	4,914	-	4,914
Food, beverages etc	10,042	1,277	11,319	9,798r	1,328r	11,126r	9,782	1,278	11,060
Textiles, leather, etc	2,986	-	2,986	2,905r	-	2,905r	2,887	-	2,887
Paper, printing etc	9,436	1,468	10,904	9,224r	1,637r	10,861r	9,216	1,804	11,020
Other industries	20,342	968r	21,310r	19,837r	1,031r	20,869r	19,963	1,077	21,040
Construction	1,524	15	1,539	1,479r	15	1,494r	1,449	15	1,464
Transport *(3)*	**4,084r**	**-**	**4,084r**	4,097r	**-**	4,097r	**4,109**	**-**	**4,109**
Rail *(4)*	4,063r	**-**	4,063r	4,076r	**-**	4,076r	4,076	**-**	4,076
Road *(5)*	21	**-**	21	21r	**-**	21r	33	**-**	33
Other	**207,885r**	**3,557r**	**211,441r**	**210,810r**	**5,111r**	**215,921r**	**209,167**	**6,017**	**215,184**
Domestic *(6)*	111,482	122r	111,604r	114,155	609r	114,764r	112,682	771	113,453
Standard	74,506	-	74,506	76,315	-	76,315	76,060	-	76,060
Economy 7 and other off-peak *(7)*	18,744	-	18,744	19,239	-	19,239	18,740	-	18,740
Prepayment (standard)	13,863	-	13,863	14,219	-	14,219	13,880	-	13,880
Prepayment (off-peak) *(7)*	4,369	-	4,369	4,382	-	4,382	4,001	-	4,001
Sales under any other arrangement	-	-	-	0	-	0	-	-	-
Public administration	16,510	1,885	18,396	16,617	2,296r	18,913r	16,041	2,781	18,822
Public lighting *(8)*	1,906	-	1,906	1,908	-	1,908	1,859	-	1,859
Other public sector	14,604	1,885	16,490	14,710	2,296r	17,005r	14,182	2,781	16,962
Commercial	75,945r	1,549r	77,494r	76,167r	2,206r	78,372r	76,570	2,465	79,035
Shops	27,766	-	27,766	27,808	-	27,808	30,272	-	30,272
Offices	24,731	-	24,731	24,779	-	24,779	24,864	-	24,864
Hotels	8,641	-	8,641	8,723	-	8,723	8,767	-	8,767
Combined domestic/ commercial premises	2,595	-	2,595	2,604	-	2,604	2,684	-	2,684
Post and telecommunications	5,970	-	5,970	5,986	-	5,986	5,904	-	5,904
Unclassified	2,354	-	2,354	2,374	-	2,374	-	-	-
Transport services	3,888r	-	3,888r	3,893r	-	3,893r	4,079	-	4,079
Agriculture	3,948	-	3,948	3,871	-	3,871	3,874	-	3,874

(1) Pumped storage production.
(2) Total supply minus total demand.
(3) From 2004, non-traction Transport sector consumption is included under 'Transport Services'.
(4) From 2004, this includes light rail and metro systems (eg. London Underground).
(5) Included from 2004.
(6) From 2011, this includes consumption by domestic generators. See paragraph 5.21.
(7) Electricity consumed under an off-peak tariff.
(8) Sales for public lighting purposes are increasingly covered by wider contracts that cannot distinguish the public lighting element.

5.3 Fuel used in generation[1]

	Unit	2009	2010	2011	2012	2013
						Original units of measurement
Major power producers (2)						
Coal	M tonnes	38.26	40.23	40.57	53.84	49.84
Oil (3)	"	0.63	0.46	0.29	0.30	0.19
Gas (5)	GWh	328,249	342,150	275,591	182,409	171,551
Other generators (2)						
Transport undertakings:						
Gas	GWh	16	18	14	13	10
Undertakings in industrial and commercial sectors:						
Coal (4)	M tonnes	1.42	1.27	1.28	1.06r	0.20
Oil (5)	"	0.43	0.48	0.38	0.28r	0.30
Gas (6)	GWh	31,038	31,418	31,534	32,216r	30,763
						Mtoe
Major power producers (2)						
Coal		23.791	24.780	25.232	33.666	31.310
Oil (3)		1.025	0.634	0.346	0.407	0.239
Gas		28.224	29.420	23.697	15.684	14.751
Nuclear		15.230	13.926	15.626	15.206	15.443
Hydro (natural flow) (7)		0.369	0.232r	0.395r	0.359r	0.310
Wind		0.562r	0.700r	1.090r	1.459r	2.049
Other renewables (7)		0.744r	1.013r	1.263r	1.766r	2.408
Net imports		0.246	0.229	0.535	1.021r	1.241
Total major power producers (2)		**70.192r**	**70.935r**	**68.183r**	**69.567r**	**67.750**
Of which: conventional thermal and other stations (10)		26.424r	27.572r	28.232r	37.544r	35.974
combined cycle gas turbine stations		27.923	28.975	23.394	15.438	14.782
Other generators (2)						
Transport undertakings:						
Gas (6)		0.001	0.002	0.001	0.001	0.001
Undertakings in industrial and commercial sectors:						
Coal (4)		0.871	0.782	0.794	0.661r	0.135
Oil (5)		0.488	0.544	0.437	0.320r	0.350
Gas		2.669	2.701	2.711	2.770r	2.645
Hydro (natural flow) (7)		0.081r	0.074r	0.094r	0.096r	0.094
Wind, wave and solar photovoltaics		0.238r	0.179r	0.262r	0.348r	0.571
Other renewables (7)		3.134r	3.273r	3.362r	3.339r	3.426
Other fuels (9)		0.993	0.802	1.024	1.112r	1.307
Total other generators *(2)*		**8.474r**	**8.357r**	**8.685r**	**8.647r**	**8.528**
All generating companies						
Coal (4)		24.662	25.562	26.026	34.327r	31.444
Oil (3)(5)		1.513	1.178	0.783	0.727r	0.589
Gas (6)		30.895	32.123	26.409	18.456r	17.397
Nuclear		15.230	13.926	15.626	15.206	15.443
Hydro (natural flow) (7)		0.450r	0.307r	0.489r	0.454r	0.404
Wind, wave and solar photovoltaics		0.800r	0.879r	1.351r	1.807r	2.620
Other renewables (7)		3.877r	4.286r	4.625r	5.105r	5.834
Other fuels (9)		0.993	0.802	1.024	1.112r	1.307
Net imports		0.246	0.229	0.535	1.021r	1.241
Total all generating companies		**78.666r**	**79.292r**	**76.868r**	**78.214r**	**76.279**

(1) A monthly update of fuel used in electricity generation by major power producers is given in Table 5.1 of Energy Trends, and a quarterly update of fuel used in electricity generation by all generating companies is given in Table 5.4 of Energy Trends.
(2) See paragraphs 5.66 to 5.72 for information on companies covered.
(3) Includes orimulsion, oil used in gas turbine and diesel plant, and oil used for lighting up coal fired boilers.
(4) Includes coke oven coke.
(5) Includes refinery gas.
(6) Includes colliery methane.
(7) Renewable sources which are included under hydro and other renewables in this table are shown separately in Table 6.6 of Chapter 6.
(8) Includes electricity supplied by gas turbines and oil engines. From 1988 also includes electricity produced by plants using renewable sources.
(9) Main fuels included are coke oven gas, blast furnace gas, and waste products from chemical processes.
(10) Includes gas turbines and oil engines and plants producing electricity from renewable sources other than hydro.

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

GWh

	2009	2010	2011	2012	2013
Total supply					
(as given in Tables 5.1 and 5.2)	379,579r	384,370r	373,473r	375,277r	373,581
less imports of electricity	-6,609r	-7,144r	-8,689r	-13,742r	-17,533
plus exports of electricity	+3,748r	+4,481r	+2,467r	+1,871r	+3,103
less electricity used in pumped storage	-4,843r	-4,212r	-3,843r	-3,978r	-3,930
less electricity used on works	-16,569r	-16,106r	-16,414r	-17,946r	-17,888
equals					
Electricity supplied (net)	355,306r	361,389r	346,994r	341,482r	337,335
(as given in Tables 5.5, 5.1.2 and 5.1.3)					
Total supply					
(as given in Tables 5.1 and 5.2)	379,579r	384,370r	373,473r	375,277r	373,581
less electricity used in pumped storage	-4,843r	-4,212r	-3,843r	-3,978r	-3,930
less electricity used on works	-16,569r	-16,106r	-16,414r	-17,946r	-17,888
equals					
Electricity available	358,167r	364,052r	353,216r	353,353r	351,764
(as given in Table 5.1.2)					
Final consumption					
(as given in Tables 5.1 and 5.2)	321,748r	328,829r	317,886r	317,831r	317,300
plus Iron and steel consumption counted as energy industry use	+603	+421	+380r	+485r	+574
equals					
Final users	322,351r	329,250r	318,267r	318,316r	317,874
(as given in Table 5.1.2)					
Final consumption					
Public distribution system					
(as given in Table 5.2)	309,244r	315,392r	303,765r	304,221r	302,720
plus Oil and gas extraction use	+594r	+563r	+576r	+565r	+570
plus Petroleum refineries use	+1,464r	+1,407r	+1,357r	+1,338r	+1,291
plus Coal and coke use	+928r	+950r	+847r	+825r	+796
plus Other fuel industries use	+1,554r	+1,608r	+1,489r	+1,460r	+1,402
equals					
UK Electricity sales *(1)*	313,784r	319,919r	308,033r	308,408r	306,778

(1) A calendar year estimate of the Renewables Obligation percentage can be calculated using the "total generation from sources eligible for the Renewable Obligation" figure from Table 6.4 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 website at: www.gov.uk/government/publications/electricity-section-5-energy-trends

5.5 Electricity fuel use, generation and supply

GWh

	Thermal sources							Non-thermal sources			
	Coal	Oil	Gas	Nuclear	Renew-ables (1)	Other (3)	Total	Hydro-natural flow	Hydro-pumped storage	Wind and solar (4)	Total All sources
2009											
Major power producers *(2) (5)*											
Fuel used	276,689	11,926	328,249	177,124	8,648	-	802,635	4,294	3,685	6,540r	817,155r
Generation	99,287	3,839r	152,598	69,098	2,670r	-	327,491	4,294	3,685	6,540r	342,011r
Used on works	5,030	476r	2,613	6,336	268r	-	14,723r	15	13	-	14,750r
Supplied (gross)	94,257	3,363r	149,985	62,762	2,402r	-	312,769	4,279	3,672	6,540r	327,260r
Used in pumping											4,843
Supplied (net)											322,417r
Other generators *(2) (5)*											
Fuel used	10,132	5,671	31,054	-	36,443r	11,551	94,851r	936r	-	2,764r	98,551r
Generation	3,751	2,155	13,901	-	8,004r	3,196	31,007r	936r	-	2,764r	34,707r
Used on works	210	154	431	-	843r	165	1,803r	16r	-	-	1,819r
Supplied	3,541	2,002	13,471	-	7,161r	3,031	29,205r	920r	-	2,764r	32,888r
All generating companies											
Fuel used	286,820	17,597r	359,303	177,124	45,091r	11,551	897,486r	5,231r	3,685	9,304r	915,706r
Generation	103,038	5,995r	166,499	69,098	10,674r	3,196	358,499r	5,231r	3,685	9,304r	376,718r
Used on works	5,240	629r	3,044	6,336	1,111r	165	16,525r	31r	13	-	16,569r
Supplied (gross)	97,798	5,365	163,455	62,762	9,562r	3,031	341,973r	5,199r	3,672	9,304r	360,149r
Used in pumping											4,843
Supplied (net)											355,306r
2010											
Major power producers *(2) (5)*											
Fuel used	288,195	7,376	342,150	161,959	11,778	-	811,459	2,703	3,150	8,141	825,453
Generation	103,941	2,271r	161,748r	62,140	3,691r	-	333,791	2,703	3,150	8,141	347,785
Used on works	5,233	311r	2,770r	5,698	371r	-	14,383	9	11	-	14,403
Supplied (gross)	98,708	1,960r	158,977r	56,442	3,321r	-	319,408	2,694	3,139	8,141	333,382
Used in pumping											4,212
Supplied (net)											329,170
Other generators *(2) (5)*											
Fuel used	9,095	6,328	31,436	-	38,071r	9,322	94,252r	865r	-	2,081r	97,197r
Generation	3,753	2,532	13,908	-	8,305r	2,478	30,976r	865r	-	2,081r	33,921r
Used on works	195	186	431	-	740r	135	1,687r	15r	-	-	1,702r
Supplied	3,558	2,346	13,478	-	7,565r	2,342	29,289r	850r	-	2,081r	32,219r
All generating companies											
Fuel used	297,290	13,705	373,586	161,959	49,849r	9,322	905,710r	3,568r	3,150	10,222r	922,650r
Generation	107,694	4,803r	175,656r	62,140	11,996r	2,478	364,767r	3,568r	3,150	10,222r	381,707r
Used on works	5,428	497r	3,201r	5,698	1,111r	135	16,070r	24r	11	-	16,106r
Supplied (gross)	102,266	4,306r	172,455r	56,442	10,885r	2,342	348,697r	3,543r	3,139	10,222r	365,601r
Used in pumping											4,212
Supplied (net)											361,389r
2011											
Major power producers *(2) (5)*											
Fuel used	293,444	4,022	275,591	181,732	14,685	-	769,474	4,594	2,906	12,675	789,649
Generation	104,797	1,074	132,753	68,980	4,533	-	312,137	4,594	2,906	12,675	332,312
Used on works	5,245	161	2,268	6,325	455	-	14,454	16	10	-	14,480
Supplied (gross)	99,552	913	130,485	62,655	4,078	-	297,683	4,578	2,895	12,675	317,832
Used in pumping											3,843
Supplied (net)											313,988
Other generators *(2) (5)*											
Fuel used	9,234	5,081	31,548	-	39,099r	11,910	96,873r	1,088r	-	3,042r	101,004r
Generation	3,774	2,043	13,767	-	8,565r	2,660r	30,809r	1,088r	-	3,042r	34,939r
Used on works	204	151	426	-	986r	147r	1,913r	21r	-	-	1,934r
Supplied	3,570	1,892	13,341	-	7,579r	2,512r	28,895r	1,068r	-	3,042r	33,005r
All generating companies											
Fuel used	302,677	9,104	307,140	181,732	53,784r	11,910	866,347r	5,682r	2,906	15,718r	890,652r
Generation	108,571	3,117	146,520	68,980	13,098r	2,660r	342,946r	5,682r	2,906	15,718r	367,251r
Used on works	5,449	311	2,694	6,325	1,441r	147r	16,368r	37r	10	-	16,414r
Supplied (gross)	103,122	2,805	143,826	62,655	11,657r	2,512r	326,578r	5,646r	2,895	15,718r	350,837r
Used in pumping											3,843
Supplied (net)											346,994r

5.5 Electricity fuel use, generation and supply (continued)

GWh

	Thermal sources							Non-thermal sources			
	Coal	Oil	Gas	Nuclear	Renew-ables (1)	Other (3)	Total	Hydro-natural flow	Hydro-pumped storage	Wind and solar (4)	Total All sources
2012											
Major power producers *(2) (5)*											
Fuel used	391,530	4,736	182,409	176,846	20,535r	-	776,056r	4,169	2,966	16,970r	800,162r
Generation	140,164	1,132r	86,229	70,405	6,156r	-	304,086	4,169	2,966	16,970	328,192
Used on works	7,121	187r	1,474	6,456	618r	-	15,856	1r	10	-	15,868
Supplied (gross)	133,043	944r	84,755	63,949	5,537r	-	288,229	4,168r	2,956	16,970r	312,323r
Used in pumping											3,978
Supplied (net)											308,346r
Other generators *(2) (5)*											
Fuel used	7,687r	3,720r	32,229r	-	38,837r	12,932r	95,405r	1,115r	-	4,045r	100,566r
Generation	2,992r	1,439r	13,929r	-	8,759r	2,937r	30,055r	1,115r	-	4,045r	35,216r
Used on works	170r	106r	431r	-	1,178r	171r	2,057r	20r	-	-	2,078r
Supplied	2,822r	1,333r	13,498r	-	7,580r	2,765r	27,998r	1,095r	-	4,045r	33,138r
All generating companies											
Fuel used	399,217r	8,456r	214,638r	176,846	59,372r	12,932r	871,462r	5,285r	2,966	21,015r	900,728r
Generation	143,156r	2,571r	100,158r	70,405	14,914r	2,937r	334,141r	5,285r	2,966	21,015r	363,407r
Used on works	7,291r	293r	1,905r	6,456	1,796r	171r	17,914r	22r	10	-	17,946r
Supplied (gross)	135,865r	2,277r	98,253r	63,949	13,118r	2,765r	316,227r	5,263r	2,956	21,015r	345,461r
Used in pumping											3,978
Supplied (net)											341,484r
2013											
Major power producers *(2) (5)*											
Fuel used	364,131	2,781	171,551	179,601	27,951	-	746,016	3,609	2,898	23,830	776,354
Generation	130,204	745	82,405	70,608	9,405	-	293,367	3,609	2,898	23,830	323,704
Used on works	6,681	97	1,400	6,474	944	-	15,598	13	10	-	15,620
Supplied (gross)	123,523	648	81,005	64,134	8,461	-	277,769	3,596	2,888	23,830	308,084
Used in pumping											3,930
Supplied (net)											304,155
Other generators *(2) (5)*											
Fuel used	1,566	4,068	30,773	-	39,896	15,198	91,500	1,089	-	6,645	99,234
Generation	564	1,391	13,207	-	9,087	3,462	27,712	1,089	-	6,645	35,446
Used on works	27	102	410	-	1,504	203	2,246	22	-	-	2,267
Supplied	537	1,288	12,798	-	7,583	3,260	25,466	1,067	-	6,645	33,179
All generating companies											
Fuel used	365,697	6,849	202,325	179,601	67,847	15,198	837,516	4,698	2,898	30,475	875,588
Generation	130,768	2,135	95,612	70,608	18,492	3,462	321,079	4,698	2,898	30,475	359,150
Used on works	6,708	200	1,810	6,474	2,448	203	17,843	34	10	-	17,888
Supplied (gross)	124,060	1,936	93,802	64,134	16,044	3,260	303,236	4,664	2,888	30,475	341,263
Used in pumping											3,930
Supplied (net)											337,333

	2009		2010		2011		2012		2013	
	Conv-entional thermal (6)	CCGT	Conv-entional thermal (6)	CCGT	Conv-entional thermal (6)	CCGT	Conv-entional thermal (6)	CCGT	Conv-entional thermal (6)	CCGT
Major power producers *(2)*										
Generated	106,939	151,454	111,133	160,518	111,270	131,886	148,034	85,647	373,805	81,980
Supplied (gross)	101,100	148,907	105,148	157,818	105,359	129,669	140,073	84,207	350,767	80,601
Other generators										
Generated	20,218	10,790	20,368	10,609	20,249	10,560	19,982	10,074	40,604	9,402
Supplied (gross)	18,953	10,251	19,210	10,079	18,862	10,033	18,427	9,571	36,914	8,933
All generating companies										
Generated	127,157	162,244	131,501	171,126	131,519	142,447	168,015	95,721	414,409	91,383
Supplied (gross)	120,053	159,159	124,357	167,898	124,221	139,702	158,500	93,778	387,681	89,535

(1) Thermal renewable sources are those included under bioenergy in Chapter 6. Prior to 2007, non-biodegradable wastes are also included.
(2) See paragraphs 5.66 to 5.72 on companies covered.
(3) Other thermal sources include coke oven gas, blast furnace gas and waste products from chemical processes. From 2007, non-biodegradable wastes are also included.
(4) For Major Power Producers, this is wind only; for other generators, this includes solar photovoltaics as well as wave and tidal.
(5) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.68.
(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.

5.6 Plant capacity - United Kingdom

MW

	end December				
	2009	2010	2011	2012	2013
Major power producers *(1)*					
Total transmission entry capacity *(2)*	**77,881r**	**83,432r**	**81,783**	**81,873r**	**76,505**
Of which:					
Conventional steam stations:	32,831	32,839	31,763	28,523	22,886
Coal fired	23,077	23,085	23,072	23,072	20,336
Oil fired	3,638	3,638	3,638	2,338	1,370
Mixed or dual fired *(3)*	6,116	6,116	5,053	3,113	1,180
Combined cycle gas turbine stations	26,785	31,724	30,183	33,113	32,967
Nuclear stations	10,858	10,865	10,663	9,946	9,906
Gas turbines and oil engines	1,779	1,779	1,706	1,651	1,639
Hydro-electric stations:					
Natural flow *(4)*	1,395	1,391	1,391	1,391r	1,392
Pumped storage	2,744	2,744	2,744	2,744	2,744
Wind *(4) (5)*	1,275r	1,867r	2,240	3,276r	3,905
Renewables other than hydro and wind *(6)*	213	223	1,092	1,228r	1,066
Other generators *(1)*					
Total capacity of own generating plant ***(7)***	**6,945r**	**7,034r**	**7,234r**	**7,542r**	**8,486**
Of which:					
Conventional steam stations *(8)*	2,408r	2,475r	2,407	2,464r	2,092
Combined cycle gas turbine stations	2,267r	2,303r	2,206	2,244r	2,180
Hydro-electric stations (natural flow) *(4)*	127r	129r	153r	157r	159
Wind *(4) (9)*	625r	454r	537r	549r	915
Renewables other than hydro and wind *(4) (6)*	1,519r	1,674r	1,931r	2,128r	3,140
All generating companies					
Total capacity	**84,826r**	**90,466r**	**89,018r**	**89,415r**	**84,991**
Of which:					
Conventional steam stations *(8)*	35,239r	35,314r	34,170	30,987r	24,978
Combined cycle gas turbine stations	29,051r	34,027r	32,389	35,357r	35,147
Nuclear stations	10,858	10,865	10,663	9,946	9,906
Gas turbines and oil engines	1,779	1,779	1,706	1,651	1,639
Hydro-electric stations:					
Natural flow *(4)*	1,523r	1,520r	1,544r	1,549r	1,551
Pumped storage	2,744	2,744	2,744	2,744	2,744
Wind *(4)*	1,900r	2,321r	2,777r	3,825r	4,820
Renewables other than hydro and wind *(4)*	1,732r	1,897r	3,024r	3,356r	4,206

(1) See paragraphs 5.66 to 5.72 for information on companies covered.
(2) See paragraph 5.79 for definition. Data before 2006 are based on declared net capacity.
(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) Small-scale hydro, wind and solar photovoltaics capacity are shown on declared net capability basis, and are de-rated to account for intermittency, by factors of 0.365, 0.43 and 0.17 respectively. See paragraph 5.80.
(5) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.68
(6) For Major Power Producers, this includes bioenergy; for other generators, this includes bioenergy, solar photovoltaics, wave and tidal.
(7) "Other generators" capacities are given in declared net capacity terms, see paragraph 5.80.
(8) 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.
(9) Falls in capacity in 2007, 2010 and 2012 due to re-classification of capacity to Major Power Producers.

5.7 Major Power Producers Plant capacity - England and Wales, Scotland, and Northern Ireland

MW

	2009	2010	2011	2012	2013
					end December
Major power producers in England and Wales *(1)*					
Total transmission entry capacity *(2)*	**65,067r**	**70,708r**	**69,047**	**68,702r**	**62,105**
Of which:					
Conventional steam stations:	28,315	28,323	27,247	24,007	17,510
Coal fired	19,621	19,629	19,616	19,616	16,020
Oil fired	3,638	3,638	3,638	2,338	1,370
Mixed or dual fired *(3)*	5,056	5,056	3,993	2,053	120
Combined cycle gas turbine stations	24,120	29,404	27,985	30,915	30,765
Nuclear stations	8,569	8,576	8,374	7,657	7,617
Gas turbines and oil engines	1,256	1,256	1,187	1,132	1,062
Hydro-electric stations:					
Natural flow	130	131	131	131r	131
Pumped storage	2,004	2,004	2,004	2,004	2,004
Wind *(4)*	504r	846r	1,080	1,682r	2,004
Renewables other than hydro and wind *(5)*	169	169	1,039	1,174r	1,012
Major power producers in Scotland *(1)*					
Total transmission entry capacity ***(2)***	**10,380r**	**10,292r**	**10,301**	**10,735r**	**11,442**
Of which:					
Conventional steam and combined cycle gas turbine stations	5,097	4,752	4,638	4,638	5,058
Nuclear stations	2,289	2,289	2,289	2,289	2,289
Gas turbines and oil engines	265	265	260	260	260
Hydro-electric stations:					
Natural flow	1,265	1,260	1,261	1,261r	1,261
Pumped storage	740	740	740	740	740
Wind *(4)*	681r	932r	1,059	1,494r	1,780
Renewables other than hydro and wind *(5)*	44	54	54	54	54
Major power producers in Northern Ireland *(1)*					
Total transmission entry capacity *(2)*	**2,434r**	**2,432r**	**2,436**	**2,436r**	**2,957**

(1) See paragraphs 5.66 to 5.72 for information on companies covered.
(2) See paragraph 5.79 for definition. Data before 2006 are based on declared net capacity.
(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 5.68.
(5) Bioenergy only.

5.8 Capacity of other generators

MW

	2009	2010	2011	2012	2013
					end December
Capacity of own generating plant [(1) (2)]					
Undertakings in industrial and commercial sector:					
Oil and gas terminals and oil refineries	1,012	1,045	1,050r	1,019r	1,014
Iron and steel	316	316	315r	314r	314
Chemicals	1,039	1,104	1,018r	1,061r	1,013
Engineering and other metal trades	626	626	644r	644	230
Food, drink and tobacco	408	411	428r	439r	426
Paper, printing and publishing	522	491	420r	467r	516
Other *(3)*	2,918r	2,937r	3,254r	3,497r	4,869
Total industrial, commercial and domestic sector	6,843r	6,931r	7,131r	7,439r	8,383
Undertakings in transport sector	103	103	103	103	103
Total other generators	**6,946r**	**7,034r**	**7,234r**	**7,542r**	**8,486**

(1) For combined heat and power plants the electrical capacity only is included. Further CHP capacity is included under major power producers in Table 5.6. A detailed analysis of CHP capacity is given in the tables of Chapter 7. Figures may not sum to 5.6 due to rounding.
(2) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.68.
(3) Includes companies in the commercial sector, and domestic installations.

5.9 Plant loads, demand and efficiency

Major power producers [1]

	Unit	2009	2010	2011	2012	2013
Simultaneous maximum load met *(2) (3)*	MW	60,231	60,893	57,086	57,490	53,420
of which England and Wales	MW					
Scotland	MW					
Great Britain	MW	58,510	59,130	55,505	55,765	51,811
Northern Ireland	MW	1,721	1,763	1,581	1,725	1,609
Maximum demand as a percentage of UK Major Power Producers' capacity	Per cent	77.3r	73.0r	69.8	70.2r	69.8
Plant load factor *(2) (4)*						
Combined cycle gas turbine stations	Per cent	64.2	61.6	47.8	30.3r	27.9
Nuclear stations	"	65.6	59.3	66.4	70.7r	73.8
Pumped storage hydro	"	15.3	13.1	12.0	12.3r	12.0
Conventional thermal and other stations *(5)*	"	33.2	34.5	34.7	48.3r	53.3
of which coal-fired stations *(6)*	"	38.5	40.2	40.8	56.9r	58.4
All plant *(7)*	"	**47.3r**	**46.0r**	**42.5r**	**42.0r**	**45.1**
System load factor *(8)*	"	**64.5r**	**64.6r**	**66.7r**	**66.2r**	**70.8**
Thermal efficiency *(9)*						
(gross calorific value basis)						
Combined cycle gas turbine stations	"	46.6	47.6r	48.5r	47.7	48.4
Coal fired stations	"	35.9	36.1	35.7	35.8r	35.8
Nuclear stations	"	39.0	38.4	38.0	39.8	39.3

(1) See paragraphs 5.66 to 5.72 for information on companies covered.
(2) Load met by transmission network, net of demand met by embedded generation. See paragraph 5.81 for definitions.
(3) Data cover the 12 months ending March of the following year, e.g. 2013 data are for the year ending March 2014.
(4) Load factors for renewable sources, including wind and hydro, can be found in Table 6.5.
(5) Conventional steam plants, gas turbines and oil engines and plants producing electricity from thermal renewable sources.
(6) Includes both coal-fired stations, and dual/mixed fired stations that mainly use coal.
(7) Includes wind (from 2008) and natural flow hydro, using capacity that has not been de-rated for intermittency.
(8) Average electricity available as percentage of maximum demand. See paragraph 5.81.
(9) See paragraph 5.82 for definition of thermal efficiency.

5.10 Power Stations in the United Kingdom

(operational at the end of May 2014)[1]

Company Name	Station Name	Fuel	Installed Capacity (MW)	Year of commission or year generation began	Location Scotland, Wales Northern Ireland, or English region
A7 Energy *(2)*	Greendykeside	wind	4	2007	Scotland
	Lochhead	wind	6	2009	Scotland
AES	Ballylumford C	CCGT	616	2003	Northern Ireland
	Kilroot	coal/oil	520	1981	Northern Ireland
	Ballylumford B	gas	540	1968	Northern Ireland
	Ballylumford B OCGT	gas oil	116	1968	Northern Ireland
	Kilroot OCGT	gas oil	142	1981	Northern Ireland
Baglan Generation Ltd	Baglan Bay	CCGT	510	2002	Wales
Barking Power *(3)*	Barking	CCGT	1000	1994	London
Beaufort Wind Ltd *(4)*	Bears Down	wind	10	2001	South West
	Bein Ghlas	wind	8	1999	Scotland
	Bryn Titli	wind	10	1994	Wales
	Carno	wind	34	1996	Wales
	Farr	wind	92	2006	Scotland
	Ffynnon Oer	wind	32	2006	Wales
	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
	Causeymire	wind	48	2004	Scotland
	North Hoyle	wind (offshore)	60	2003	Wales
BIIF LP	Black Hill	wind	29	2006	Scotland
	Wadlow	wind	26	2012	England
Braes of Doune Windfarm *(5)*	Braes of Doune	wind	72	2007	Scotland
British Energy *(6)*	Dungeness B	nuclear	1040	1983	South East
	Hartlepool	nuclear	1180	1984	North East
	Heysham 1	nuclear	1155	1984	North West
	Heysham 2	nuclear	1220	1988	North West
	Hinkley Point B	nuclear	945	1976	South West
	Hunterston B	nuclear	960	1976	Scotland
	Sizewell B	nuclear	1198	1995	East
	Torness	nuclear	1185	1988	Scotland
Cemmaes Windfarm Ltd *(7)*	Cemmaes	wind	15	2002 *(8)*	Wales
Centrica	Barry *(9)*	CCGT	140	1998	Wales
	Glanford Brigg *(9)*	CCGT	150	1993	Yorkshire and the Humber
	Killingholme	CCGT	665	1994	Yorkshire and the Humber
	Langage	CCGT	905	2010	South West
	Peterborough *(9)*	CCGT	240	1993	East
	South Humber Bank	CCGT	1310	1996	Yorkshire and the Humber
	Glens of Foudland	wind	26	2005	Scotland
	Inner Dowsing	wind (offshore)	97	2009	East Midlands
	Lynn	wind (offshore)	97	2009	East Midlands
CEP Wind 2 Ltd *(10)*	Gruig	wind	25	2009	Northern Ireland
Cold Northcott Windfarm Ltd *(7)*	Cold Northcott	wind	7	1993	South West
Coolkeeragh ESB Ltd	Coolkeeragh	CCGT	408	2005	Northern Ireland
	Coolkeeragh OCGT	gas oil	53	2005	Northern Ireland
Corby Power Ltd	Corby	CCGT	401	1993	East Midlands
Dong Energy	Severn	CCGT	848	2010	Wales
	Barrow *(11)*	wind (offshore)	90	2006	North West
	Burbo Bank	wind (offshore)	90	2009	North West
	Gunfleet Sands 1	wind (offshore)	108	2010	South East
	Gunfleet Sands 2	wind (offshore)	65	2010	South East
	Gunfleet Sands 3	wind (offshore)	65	2013	South East
	Lincs *(11)*	wind (offshore)	270	2012	East

For footnotes see page 152

5.10 Power Stations in the United Kingdom
(operational at the end of May 2014)[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
Dong Energy (continued)	Walney 1 *(3)*	wind (offshore)	184	2011	North West
	Walney 2 *(3)*	wind (offshore)	184	2011	North West
	West of Duddon Sands	wind (offshore)	389	2014	North West
Drax Power Ltd	Drax	coal/biomass	3870	1974	Yorkshire and the Humber
	Drax GT	gas oil	75	1971	Yorkshire and the Humber
E.On UK	Ironbridge	biomass	360	1970	West Midlands
	Steven's Croft *	biomass	50	2007	Scotland
	Castleford	CCGT	56	2002	Yorkshire and the Humber
	Connahs Quay	CCGT	1380	1996	Wales
	Cottam Development Centre	CCGT	395	1999	East Midlands
	Enfield	CCGT	408	1999	London
	Grain	CCGT	1365	2010	South East
	Killingholme	CCGT	900	1993	Yorkshire and the Humber
	Sandbach	CCGT	56	1999	North West
	Thornhill	CCGT	50	1998	Yorkshire and the Humber
	Ratcliffe	coal	2000	1968	East Midlands
	Grain GT *	gas oil	55	1978	South East
	Ratcliffe GT	gas oil	34	1966	East Midlands
	Taylor's Lane GT	gas oil	144	1979	London
	Askam	wind	5	1999	North West
	Bowbeat	wind	31	2002	Scotland
	Butterwick Moor	wind	19	2011	North East
	Camster	wind	50	2012	Scotland
	Deucheran Hill	wind	16	2001	Scotland
	Great Eppleton	wind	8	2010	North East
	Hare Hill	wind	6	2004	North East
	Haswell Moor	wind	10	2010	North East
	High Volts	wind	8	2004	North East
	Holmside	wind	6	2004	North East
	Lowca	wind	5	2000	North West
	Oldside	wind	5	1996	North West
	Out Newton	wind	9	2002	Yorkshire and the Humber
	Rhyd-y-Groes	wind	7	1992	Wales
	Rosehall	wind	25	2012	Scotland
	Siddick	wind	4	1996	North West
	Stags Holt	wind	20	2007	East
	Tween Bridge	wind	44	2012	North East
	Blyth	wind (offshore)	4	2000	North East
	Robin Rigg	wind (offshore)	180	2010	Scotland
	Scroby Sands	wind (offshore)	60	2004	East
EDF Energy	West Burton CCGT	CCGT	1410	2012	East Midlands
	Cottam	coal	2008	1969	East Midlands
	West Burton	coal	2012	1967	East Midlands
	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
	Barkantine Heat & Power Company *	gas	1	2000	London
	London Heat & Power Company *	gas	9	2000	London
	West Burton GT	gas oil	40	1967	East Midlands
	Thames Valley Power * (Imperial College)	gas/gas oil	15	1995	London
EDF Energy Renewables	Bicker Fen	wind	26	2008	East Midlands
	Boundary Lane	wind	6	2013	North East
	Burnfoot Hill	wind	26	2010	Scotland
	Fairfield	wind	7	2011	North West
	Fallago	wind	144	2013	Scotland
	Glass Moor II	wind	12	2013	East Midlands
	Green Rigg	wind	36	2012	North East
	Longpark	wind	38	2009	Scotland
	Roade	wind	7	2014	Northampton
	Rusholme	wind	24	2010	Yorkshire and the Humber
	Walkway	wind	14	2008	North East
Eggborough Power Ltd	Eggborough	coal	1960	1967	Yorkshire and the Humber
EPR Ely Limited	Elean	straw/gas	38	2001	East

For footnotes see page 152

5.10 Power Stations in the United Kingdom
(operational at the end of May 2014)[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
EPR Eye Ltd	Eye, Suffolk	AWDF *(12)*	13	1992	East
EPR Glanford Ltd	Glanford	meat & bone meal	13	1993	East
EPR Scotland Ltd	Westfield	poultry litter	12	2000	Scotland
EPR Thetford Ltd	Thetford	poultry litter	39	1998	East
Falck Renewables Wind Ltd	Ben Aketil	wind	28	2007	Scotland
	Boyndie	wind	16	2006	Scotland
	Cefn Croes	wind	59	2006	Wales
	Earlsburn	wind	38	2007	Scotland
	Kilbraur	wind	68	2008	Scotland
	Millennium	wind	65	2008	Scotland
	Nutberry	wind	15	2013	Scotland
Fenland Windfarms Ltd *(7)*	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 II	wind	138	2010	Scotland
	Crystal Rig Windfarm	wind	63	2003	Scotland
	Mid Hill	wind	76	2014	Scotland
	Paul's Hill	wind	64	2005	Scotland
	Rothes	wind	51	2004	Scotland
	Rothes II	wind	41	2013	Scotland
GDF Suez	Blantyre	wind	17	2014	Scotland
	Crimp	wind	2	2011	England
	Crimp	wind	2	2011	South West
	Flimby	wind	6	2013	England
	Scotia	wind	20	2010	Scotland
	Sober	wind	12	2013	England
Great Orton Windfarm Ltd *(6)(7)*	Great Orton	wind	4	1999	North West
High Hedley Hope Wind Ltd *(7)*	Broomhill	wind	8	2008	North East
	High Hedley 1	wind	2	2001	North East
	High Hedley 2	wind	5	2008	North East
	Langley Park	wind	8	2008	North East
	Trimdon Grange	wind	5	2008	North East
Infinis	Ardrossan	wind	24	2004	Scotland
	Ardrossan Extension	wind	6	2008	Scotland
	Blackstone Edge	wind	6	2013	Yorkshire and the Humber
	Dalswinton	wind	30	2008	Scotland
	Glenkerie	wind	20	2012	Scotland
	Gordonstown	wind	6	2013	Scotland
	Hill of Fiddes	wind	7	2010	Scotland
	Lissett	wind	30	2007	Yorkshire and the Humber
	Low Spinney	wind	8	2011	East Midlands
	Minsca	wind	37	2008	Scotland
	Mynydd Clogau	wind	14	2004	Wales
	Rheidol	wind	2	1997	Wales
	Seamer	wind	10	2012	North East
	Slieve Divena	wind	30	2009	N Ireland
	Westfield	wind	10	2013	Scotland
	Wingates	wind	15	2013	North East
Intergen	Coryton	CCGT	800	2001	East
	Rocksavage	CCGT	810	1998	North West
	Spalding	CCGT	880	2004	East Midlands
International Power Ltd	Deeside	CCGT	515	1994	Wales
	Saltend *	CCGT	1200	2000	Yorkshire and the Humber
	Rugeley	coal	1006	1972	West Midlands
	Rugeley GT	gas oil	50	1972	West Midlands
	Indian Queens	gas oil/kerosene	140	1996	South West
	Dinorwig	pumped storage	1728	1983	Wales
	Ffestiniog	pumped storage	360	1961	Wales
K/S Winscales *(7)*	Winscales 1	wind	2	1999	North West
	Winscales 2	wind	7	2005	North West

For footnotes see page 152

5.10 Power Stations in the United Kingdom
(operational at the end of May 2014)[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
Kirkheaton Wind Ltd *(7)*	Kirkheaton	wind	2	2000	North East
Llangwyryfon Windfarm Ltd *(7)*	Llangwyryfon	wind	9	2003	Wales
London Array Ltd *(13)*	London Array	wind (offshore)	630	2012	South East
Londonwaste Limited	Edmonton	waste	60	2012	South East
Lynemouth Power Ltd *(14)*	Lynemouth	coal	420	1972	North East
Magnox Ltd *(15)*	Maentwrog	hydro	28	1928	Wales
	Wylfa	nuclear	490	1971	Wales
Marchwood Power Limited *(16)*	Marchwood	CCGT	842	2009	South West
MEAG *(17)*	Bagmoor	wind	16	2009	East Midlands
	Scout Moor *(3)*	wind	65	2009	North West
	Tyr Mostyn & Foel Goch	wind	21	2005	Wales
Peel Energy Ltd	Seaforth	wind	3	1999	North West
Prime Renewables Gmbh	Port of Liverpool	wind	10	2008	North West
Px Limited *(18)*	Fellside *	gas	180	1995	North West
RES UK & Ireland Ltd	Dyffryn Brodyn	wind	5	1994	Wales
	Four Burrows	wind	5	1995	South West
	Meikle Carewe	wind	10	2013	Scotland
	Tallentire	wind	12	2013	England
Resonance *(17)*	Arnish Moor	wind	4	2006	Scotland
	Betty Hill	wind	6	2013	Scotland
	Dewley Cheese	wind	2	2010	North West
	Solutia	wind	5	2009	Wales
	Strath of Brydock	wind	7	2009	Scotland
	Workington (Eastman)	wind	4	2005	North West
Riverside Resource Recovery Limited	Belvedere	waste	80	2011	South East
RWE Npower Plc	Didcot B	CCGT	1470	1998	South East
	Great Yarmouth	CCGT	420	2001	East
	Little Barford	CCGT	720	1995	East
	Pembroke	CCGT	2180	2012	Wales
	Staythorpe C	CCGT	1748	2010	East Midlands
	Aberthaw B	coal	1586	1971	Wales
	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
	Little Barford GT	gas oil	17	2006	East
	Littlebrook GT	gas oil	105	1982	South East
	Littlebrook D	oil	1370	1982	South East
	Tilbury GT	rapeseed oil	68	1968	East
RWE Npower Renewables Ltd (Part of RWE Npower)	Black Rock	hydro	4	2012	Scotland
	Braevallich	hydro	2	2005	Scotland
	Carnoch	hydro	1	2009	Scotland
	Cwm Dyli	hydro	10	2002 *(8)*	Wales
	Dolgarrog High Head	hydro	17	2002 *(8)*	Wales
	Dolgarrog Low Head	hydro	15	1926/2002	Wales
	Douglas Water	hydro	3	2008	Scotland
	Garrogie	hydro	2	2005	Scotland
	Inverbain	hydro	1	2006	Scotland
	Inverlael	hydro	3	2009	Scotland
	Kielder	hydro	6	2006 *(8)*	North East
	Maldie	hydro	4	2013	Scotland
	River E	hydro	3	2008	Scotland
	An Suidhe	wind	22	2005	Scotland
	Bilbster	wind	4	2008	Scotland
	Bradwell	wind	21	2013	North East
	Burgar Hill	wind	5	2007	Scotland
	Goole Fields	wind	4	2013	North East
	Hameldon Hill	wind	6	2007	North West
	Hameldon Hill ext	wind	6	2014	Nowrth West

For footnotes see page 152

5.10 Power Stations in the United Kingdom
(operational at the end of May 2014)[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
RWE Npower Renewables Ltd (continued)	Hellrigg	wind	9	2012	North West
	Hollies	wind	3	2008	East
	Kiln Pit Hill	wind	14	2012	North East
	Knabs Ridge	wind	16	2008	North East
	Lindhurst	wind	9	2010	East Midlands
	Little Cheyne	wind	60	2008	South East
	Middlemoor	wind	54	2013	North East
	Novar 2	wind	37	2012	Scotland
	Rhyl Flats	wind (offshore)	90	2009	Wales
Scottish and Southern Hydro Schemes:					
Affric/Beauly	Aigas	hydro	20	1962	Scotland
	Culligran	hydro	17	1962	Scotland
	Culligran Compensation Set	hydro	2	1962	Scotland
	Deanie	hydro	38	1963	Scotland
	Fasnakyle	hydro	69	1951	Scotland
	Fasnakyle Compensation Set	hydro	8	2006	Scotland
	Kilmorack	hydro	20	1962	Scotland
	Mullardoch Tunnel	hydro	2	1955	Scotland
Breadalbane	Cashlie	hydro	11	1959	Scotland
	Dalchonzie	hydro	4	1958	Scotland
	Finlarig	hydro	17	1955	Scotland
	Lednock	hydro	3	1961	Scotland
	Lochay	hydro	46	1958	Scotland
	Lochay Compensation Set	hydro	2	1959	Scotland
	Lubreoch	hydro	4	1958	Scotland
	St. Fillans	hydro	17	1957	Scotland
Conon	Achanalt	hydro	3	1956	Scotland
	Cuileg	hydro	3	2002	Scotland
	Grudie Bridge	hydro	19	1950	Scotland
	Luichart	hydro	34	1954	Scotland
	Mossford	hydro	19	1957	Scotland
	Orrin	hydro	18	1959	Scotland
	Torr Achilty	hydro	15	1954	Scotland
Foyers	Foyers	hydro/ pumped storage	300	1974	Scotland
Great Glen	Ceannacroc	hydro	20	1956	Scotland
	Foyers Falls	hydro	5	1968	Scotland
	Glendoe	hydro	100	2008	Scotland
	Glenmoriston	hydro	37	1957	Scotland
	Invergarry	hydro	20	1956	Scotland
	Kingairloch	hydro	4	2005	Scotland
	Livishie	hydro	17	1962	Scotland
	Mucomir	hydro	2	1962	Scotland
	Quoich	hydro	18	1955	Scotland
Shin	Cassley	hydro	10	1959	Scotland
	Lairg	hydro	4	1959	Scotland
	Shin	hydro	18	1958	Scotland
Sloy/Awe	Allt-na-Lairige	hydro	7	1956	Scotland
	Clachan	hydro	40	1955	Scotland
	Inverawe	hydro	25	1963	Scotland
	Kilmelfort	hydro	2	1956	Scotland
	Loch Gair	hydro	6	1961	Scotland
	Lussa	hydro	2	1952	Scotland
	Nant	hydro	15	1963	Scotland
	Sloy	hydro	153	1950	Scotland
	Sron Mor	hydro	4	1957	Scotland
	Striven	hydro	8	1951	Scotland
Tummel	Clunie	hydro	61	1950	Scotland
	Cuaich	hydro	3	1959	Scotland
	Errochty	hydro	75	1955	Scotland
	Gaur	hydro	8	1953	Scotland
	Loch Ericht	hydro	2	1962	Scotland

For footnotes see page 152

5.10 Power Stations in the United Kingdom
(operational at the end of May 2014)[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
Tummel (continued)	Pitlochry	hydro	15	1950	Scotland
	Rannoch	hydro	45	1930	Scotland
	Tummel	hydro	34	1933	Scotland
Wind	Achany	wind	38	2010	Scotland
	Artfield Fell	wind	20	2005	Scotland
	Balmurrie Fell	wind	9	2012	Scotland
	Bessy Bell 1	wind	5	1995	Northern Ireland
	Bessy Bell 2	wind	9	2008	Northern Ireland
	Bin Mountain *(19)*	wind	9	2007	Northern Ireland
	Bu	wind	3	2002	Scotland
	Carcant *(19)*	wind	7	2010	Scotland
	Cathkin Braes	wind	3	2013	Scotland
	Clyde Central	wind	113	2011	Scotland
	Clyde North	wind	108	2012	Scotland
	Clyde South	wind	129	2011	Scotland
	Drumderg	wind	37	2008	Scotland
	Fairburn	wind	40	2009	Scotland
	Gordonbush	wind	70	2011	Scotland
	Griffin	wind	189	2011	Scotland
	Hadyard Hill	wind	120	2005	Scotland
	Keadby	wind	68	2013	England
	National Offshore Wind Turbine Test	wind	13	2014	Scotland
	Port of Tilbury	wind	9	2013	England
	Slieve Kirk	wind	74	2011	Northern Ireland
	Spurness Extension *(20)*	wind	10	2012	Scotland
	Tangy	wind	19	2002	Scotland
	Tappaghan *(19)*	wind	29	2005	Northern Ireland
	Toddleburn	wind	28	2010	Scotland
	Greater Gabbard *(21)*	wind (offshore)	504	2011	East
Small Hydros:	Chliostair	hydro	1	1960	Scotland
	Cuileig	hydro	3	2002	Scotland
	Kerry Falls	hydro	1	1951	Scotland
	Nostie Bridge	hydro	1	1950	Scotland
	Storr Lochs	hydro	2	1952	Scotland
Thermal:	Peterhead *(22)*	CCGT	1180	1980	Scotland
	Ferrybridge C	coal/biomass	980	1966	Yorkshire and the Humber
	Fiddler's Ferry	coal/biomass	1961	1971	North West
	Slough *	coal/biomass/ gas/waste derived fuel	61	1918	South East
	Chippenham	gas	10	2002	South West
	Ferrybridge GT	gas oil	34	1966	Yorkshire and the Humber
	Fiddler's Ferry GT	gas oil	34	1969	North West
	Keadby GT	gas oil	25	1994	Yorkshire and the Humber
	Burghfield	gas/oil	45	1998	South East
	Chickerell	gas/oil	45	1998	South West
	Five Oaks	light oil	9	1995	South East
	Thatcham	light oil	9	1994	South East
	Wheldale	mines gas	8	2002	Yorkshire and the Humber
Island Generation	Arnish	diesel	10	2001	Scotland
	Barra	diesel	3	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	19	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

For footnotes see page 152

5.10 Power Stations in the United Kingdom
(operational at the end of May 2014)[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
Galloway (continued)	Kendoon	hydro	24	1936	Scotland
	Tongland	hydro	33	1935	Scotland
Lanark	Bonnington	hydro	11	1927	Scotland
	Stonebyres	hydro	6	1927	Scotland
Cruachan	Cruachan	pumped storage	440	1966	Scotland
Thermal:	Damhead Creek	CCGT	805	2000	South East
	Rye House	CCGT	715	1993	East
	Shoreham	CCGT	420	2000	South East
	Longannet	coal	2260	1970	Scotland
	Pilkington - Greengate *	gas	10	1998	North West
Wind:	Arecleoch	wind	120	2010	Scotland
	Beinn an Tuirc I	wind	30	2001	Scotland
	Beinn an Tuirc II	wind	30	2012	Scotland
	Beinn Tharsuinn	wind	30	2007	Scotland
	Black Law	wind	124	2005	Scotland
	Callagheen	wind	17	2006	Northern Ireland
	Carland Cross RP	wind	20	2013 (23)	South West
	Clachan Flats	wind	15	2009	Scotland
	Coldham	wind	16	2006	East
	Corkey	wind	5	1994	Northern Ireland
	Cruach Mhor	wind	30	2004	Scotland
	Dun Law I	wind	17	2000	Scotland
	Dun Law II	wind	30	2009	Scotland
	Elliots Hill	wind	5	1995	Northern Ireland
	Green Knowes	wind	27	2008	Scotland
	Hagshaw Hill I	wind	16	1995	Scotland
	Hagshaw Hill II	wind	26	2009	Scotland
	Hare Hill	wind	13	2000	Scotland
	Harestanes	wind	130	2013	Scotland
	Lynemouth	wind	26	2012	Scotland
	Mark Hill	wind	56	2011	Scotland
	Middleton	wind	12	2013	Scotland
	Penryddian & Llidiartywaun	wind	31	1992	Wales
	Rigged Hill	wind	5	1994	Northern Ireland
	Wether Hill	wind	18	2007	Scotland
	Whitelee	wind	322	2007	Scotland
	Whitelee II	wind	217	2012	Scotland
	Wolf Bog	wind	10	2008	Northern Ireland
Seabank Power Limited *(24)*	Seabank 1	CCGT	812	1998	South West
	Seabank 2	CCGT	410	2000	South West
Sembcorp Utilities (UK) Ltd	Wilton 10 *	biomass	38	2007	North East
	Wilton GT2 *	gas	42	2005	North East
	Wilton Power Station	gas/coal/oil	238	1952	North East
South East London Combined Heat & Power Ltd	South East London SELCHP ERF	waste	32	1994	London
Statkraft Energy Ltd	Rheidol	hydro	49	1961	Wales
Statkraft Wind UK Ltd	Alltwalis	wind	23	2009	Wales
	Baillie	wind	53	2013	Scotland
	Berry Burn	wind	67	2013	Scotland
	Scira (Sheringham Shoal)	wind (offshore)	316	2012	East
Sutton Bridge Power Generation	Sutton Bridge	CCGT	819	1999	East
Talisman Energy	Beatrice *(3)*	wind (offshore)	10	2007	Scotland
The Renewables Infrastructure Group (UK) Ltd	Altahullion	wind	26	2003	Northern Ireland
	Altahullion2	wind	12	2007	Northern Ireland
	Forss	wind	2	2003	Scotland
	Forss2	wind	5	2007	Scotland
	Grange	wind	14	2013	England
	Hill of Towie	wind	48	2012	Scotland
	Kelburn	wind	28	2011	Scotland
	Lendrum's Bridge	wind	13	2000	Northern Ireland
	Lough Hill	wind	8	2007	Northern Ireland

For footnotes see page 152

5.10 Power Stations in the United Kingdom
(operational at the end of May 2014)[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
The Renewables Infrastructure Group (UK) Ltd (continued)	Roos	wind	17	2012	England
Third Energy Trading Ltd (Formerly RGS)	Knapton	gas	40	1994	Yorkshire and the Humber
Triodos *(17)*	Dunfermline (FMC)	wind	2	2012	Scotland
	Eye Airfield	wind	5	2013	England
Vattenfall Wind Power	Edinbane	wind	41	2010	Scotland
	Swinford	wind	22	2012	Midlands
	Kentish Flats	wind (offshore)	90	2005	South East
	Ormonde	wind (offshore)	150	2011	North West
	Thanet	wind (offshore)	300	2010	South East
Velocita *(17)*	Maerdy	wind	24	2013	Wales
VPI Immingham LLP	VPI Immingham *	gas	1240	2004	Yorkshire and the Humber
Windcluster	Haverigg III *(2)*	wind	3	2005	North West
Yorkshire Windpower Ltd *(25)*	Ovenden Moor	wind	9	1993	Yorkshire and the Humber
	Royd Moor	wind	7	1993	Yorkshire and the Humber
Total			**80,225**		

Other power stations[26]

Renewable sources	wind	2,127	
and combustible wastes	landfill gas	1,042	
	sewage gas	198	
	hydro	159	
	biomass and waste	1,696	
	solar photovoltaics and wave/tidal	2,787	
CHP schemes listed in Table 5.12	various fuels	1,813	
CHP schemes other than major power producers and renewables and those listed in Table 5.12	mainly gas	2,286	
Other autogenerators	various fuels	70	

For footnotes see page 152

5.10 Power Stations in the United Kingdom
(operational at the end of May 2014)(1) (continued)

Interconnectors

	Capacity (MW)
England - France	2,000
England - Netherlands	1,000
Scotland - Northern Ireland	500
Wales - Irish Republic	500
Northern Ireland - Irish Republic	600

Footnotes

(1) This list covers stations owned or operated by Major Power Producers; other power stations (including many renewable sites and auto-generators) are included in the sub table on page 151.

(2) Operated by HG Capital

(3) Joint venture with Scottish and Southern Energy

(4) Managed by RWE

(5) Joint venture between Green Coat Capital and Hermes, but operated by SSE.

(6) Now owned by EDF

(7) Managed by EDF Energy Renewables Ltd

(8) Recommissioning dates.

(9) Capacity reduced in 2013, with these stations typically now operating as Open Cycle Gas Turbines

(10) Operated by RES-UK & Ireland Ltd

(11) Co-owned with Centrica

(12) Animal Waste Derived Fuel, i.e. meat and bone meal, poultry litter, feathers and small quantities of other material such as wood chips

(13) Co-owned by EON (50%), Dong (25%) and La caisse de dépôt et placement du Québec (25%).

(14) Owned by RWE

(15) Owned by NDA but operated by Magnox Ltd

(16) Joint venture between SSE and ESB

(17) Operated by Wind Prospect Operations

(18) Owned by NDA but operated by Px Limited

(19) Owned by Green Coat Capital, but continues to be operated by SSE

(20) Spurness re-powered in December 2012 with a capacity of 10MW

(21) Joint venture with Green Coat Capital, but operated by SSE

(22) Total capacity is 1,840 MW but because of transmission constraints only 1,180 MW can be used at any one time.

(23) Carland Cross re-powered in 2013 (originally commissioned in 1992)

(24) Joint venture with Scottish and Southern Energy and Electricity First Limited

(25) Owned by E.On and EPR

(26) As at end December 2012.

* Indicates a CHP plant

5.11 Large scale CHP schemes in the United Kingdom
(operational at the end of December 2013)[1]

Company Name	Scheme Location	Installed Capacity (MWe) (2)
A. Pearson Growers Ltd	Europa Nursery - Ash	15
Adm Erith Ltd	Erith Oil Works	14
Agrivert Ltd	Cassington Ad	2
Anglian Water Services Limited	Tilbury Sewage Treatment Works	2
Atkins Power	Hedon Salads - Burstwick	10
Atkins Power	Hedon Salads - Newport	4
Balcas Limited	Balcas Limited	3
Balcas Timber Ltd	Balcas Invergordon	9
Barkantine Heat & Power Company	Barkantine, Barkantine Heat & Power Company	1
Basf Performance Products	Water Treatments, Basf Performance Products	16
Briar Chemicals Limited	Briar Chemicals Ltd	4
British Sugar Plc	Bury St Edmuns Sugar Factory	77
British Sugar Plc	Cantley Sugar Factory	15
British Sugar Plc	Wissington Sugar Factory, British Sugar Plc (CHP 2)	93
Cambridge University Hospitals Foundation Trust	Addenbrookes Hospital	4
Cantelo Nurseries	Bradon Farm	10
Carillion Services Ltd, Ta Carillion Health	Queen Alexandra Hospital	3
Carlsberg Uk Limited	Carlsberg Brewery Leeds	1
Celts Ltd	Levenmouth Waste Water Treatment Works	3
Chertsey STW	Chertsey STW	1
Citywest Homes	Pump House	3
Cleveland Potash Limited	Boulby Mine. Cleveland Potash Limited	13
Cofely District Energy Ltd	The Heat Station (CHP 2)	7
Cofely District Energy Ltd	Mod Main Building, Cofely Limited	5
Cofely District Energy Ltd	Soas Chp, The Boiler House	1
Cofely District Energy Ltd	Icc Energy Centre	2
Cofely District Energy Ltd	Aston University Energy Centre, Aston University	3
Cofely District Energy Ltd	Birmingham Childrens Hospital	2
Cofely Ltd	Trafford Park, Kellogg Company Of Great Britain	5
Cofely Ltd	Hillhouse International	5
Contourglobal Solutions (Northern Ireland) Ltd	Knockmore Hill CHP, Contour Global Solutions (Northern Ireland)	15
Crisp Maltings Group Ltd	Crisp Maltings Ryburgh	1
Cyclerval Uk Ltd	Newlincs Efw, Newlincs Development Ltd	3
Dalkia	Freeman Hospital	4
Dalkia	Royal Victoria Infirmary	4
Dalkia Cleanpower 2 Ltd	Fribo Foods	1
Dalkia Plc	Lincoln County Hospital	1
Dalkia Utilities Services	Eli Lilly & Co Ltd	10
De La Rue International	Overton Mill, De La Rue International Ltd	7
Dow Corning Ltd	Dow Corning Chp	27
Dsm Nutritional Products (Uk) Ltd	Dsm Dalry	46
East Sussex Healthcare Trust	Eastbourne District General Hospital	1
Enviroenergy	London Road Heat Station	11
Eon	Queens Medical Centre Nhs Trust	5
Eon	Nufarm Uk Limited	5
Eon Uk	Citigen Chp, Citigen (London) Limited	16
Eon Uk Cogeneration Ltd	Stoke Chp, Michelin Tyre Plc	61
Esso Petroleum Company Limited	Fawley Cogen	316
Fine Organics Limited	Fine Organics Limited	4
Frimley Park Hospital Nhs Foundation Trust	Frimley Park Hospital	1
Genzyme Ltd	Genzyme Ltd	1
Glaxosmithkline	Glaxosmithkline Ulverston	2
Glaxosmithkline	Glaxosmithkline Montrose	1
Glaxosmithkline	Glaxosmithkline Irvine	4
Glaxosmithkline	Barnard Castle	2
Glaxosmithkline	Glaxosmithkline, Ware	2
Great Ormond Street Hospital For Children NHS Trust	Great Ormond Street Hospital	1

For footnotes see page 155

5.11 Large scale CHP schemes in the United Kingdom

(operational at the end of December 2013)[1] *(continued)*

Company Name	Scheme Location	Installed Capacity (MWe) *(2)*
Heathcoat Fabrics Ltd	Heathcoat Fabrics Limited	1
Helix Agencies Limited	Natural History Museum	2
Helix Agencies Limited	Blackpool Victoria Hospital	1
Iggesund Paperboard (Workington) Ltd	Iggesund Paperboard (Workington) Ltd	50
Imperial College London	South Kensington Campus CHP Plant	9
Inbev Uk Ltd	Samlesbury Brewery, Inbev Uk Ltd	7
Inbev Uk Ltd	Magor Brewery, Inbev Uk Ltd	7
Ineos Chlorvinyls Limited	Runcorn, Ineos Chlorvinyls Limited	38
Ineos Newton Aycliffe Ltd	Ineos Newton Aycliffe Ltd	10
Ineos Newton Aycliffe Ltd	Gas Engine Chp	2
Integrated Energy Utilities Ltd	Callendar Park Energy Centre, Falkirk Council	1
James Cropper Plc	James Cropper Plc	7
John Thompson And Son Ltd	John Thompson & Sons Limited	4
Johnson Matthey	Johnson Matthey Enfield	3
Johnson Matthey	Johnson Matthey - Royston	6
London Borough Of Islington	Bunhill Heat And Power	2
Loughborough University	Central Park	2
Medway NHS Foundation Trust	Medway Hospital, Medway Maritime Hospital	1
Milford Haven Refinery	Milford Haven Refinery	24
Mill Nurseries Ltd	Mill Chp, Mill Nurseries	14
Nestle Uk Limited	Nestle York	10
Nhs Grampian	Aberdeen Royal Infirmary	5
North Tees & Hartlepool NHS Foundation Trust	University Hospital Of North Tees	2
Northumbrian Water Ltd	Bran Sands (Biogas)	5
Northumbrian Water Ltd	Howdon Stw	6
Novartis Grimsby Limited	Novartis Grimsby Limited	8
Peel Utilities Holdings Limited	Media City, Utilities (Media City Uk) Ltd	2
Powell Energy	St. Georges Hospital	4
Preston Board And Packaging Ltd	Romiley Board	1
Reckitt Benckister	Kwe Hull	2
Reg Bio Power Ltd	Bentwaters CHP	6
Rotherham General Hospital NHS Trust	Rotherham District General Hospital	1
Rwe Npower	Basf CHP	98
Rwe Npower	Aylesford CHP	100
Rwe Npower	Hythe CHP, Npower Cogen (Hythe) Ltd	53
Rwe Npower	Ppco Generating Plant	97
Ryobi Aluminium Casting (UK) Ltd	Ryobi	1
Sca Hygiene Products Tissue Ltd	Sca CHP	9
Scottish And Southern Energy	Slough Nurseries, G & C Properties	2
Smurfit Kappa Ssk	Smurfit Kappa Ssk Limited	9
Southern Water Services	Ashford Stc	2
Southern Water Services	Millbrook Wtw, Southern Water	1
Southern Water Services	Budds Farm Wtw, Southern Water	2
Springfields Fuels Ltd	Springfields	12
Tata Chemicals Europe	Winnington CHP	146
Tate & Lyle Sugars Ltd	Thames Refinery, Tate and Lyle New Scheme	32
Thames Water Utilities Ltd	Maple Lodge Stw	4
Thames Water Utilities Ltd	Long Reach Stw	3
Thames Water Utilities Ltd	Mogden Stw	8
Thames Water Utilities Ltd	Beddington Stw	4
Thames Water Utilities Ltd	Deephams Stw	3
Thames Water Utilities Ltd	Ryemeads Stw	1
Thames Water Utilities Ltd	Oxford Stw	2
Thames Water Utilities Ltd	Crawley Stw	1
Thames Water Utilities Ltd	Reading (Island Road) Stw	1
Thameswey Central Milton Keynes Ltd	Woking Town Centre Phase I	1

For footnotes see page 155

5.11 Large scale CHP schemes in the United Kingdom

(operational at the end of December 2013)[1] *(continued)*

Company Name	Scheme Location	Installed Capacity (MWe) *(2)*
Thameswey Central Milton Keynes Ltd	Tcmk Phase 1 CHP No 2 Gas Engine	6
Transport For London	Palestra, Transport for London	1
University of Aberdeen	Old Aberdeen Campus	2
University of Birmingham ALTA Estate Services CHP Energy Centre	The University Of Birmingham Scheme Ref 740A	6
University of Bristol	University Of Bristol CHP 2	1
University of Edinburgh Utilities Supply Company	Kings Buildings	3
University of Edinburgh Utilities Supply Company	George Square Energy Centre	2
University of Southampton	University of Southampton	3
University of Surrey	University Of Surrey	1
University of Sussex	University of Sussex	1
University of Warwick	CHP Boilerhouse (CHP 2), University Of Warwick	4
Upm-Kymmene (Uk)	Upm Shotton	22
Utilicom Ltd	University College London, Gower Street Heat And Power Ltd	3
Veolia Environmental Services Plc	Sheffield ERF	22
Weetabix Ltd	Weetabix Limited	6
Wessex Water Services Ltd	Bristol Waste Water Treatment Works Scheme A	6
Total *(2)*		1,813
Electrical capacity of good quality CHP for these sites in total		1,753

(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 5.10.

(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
Renewable sources of energy

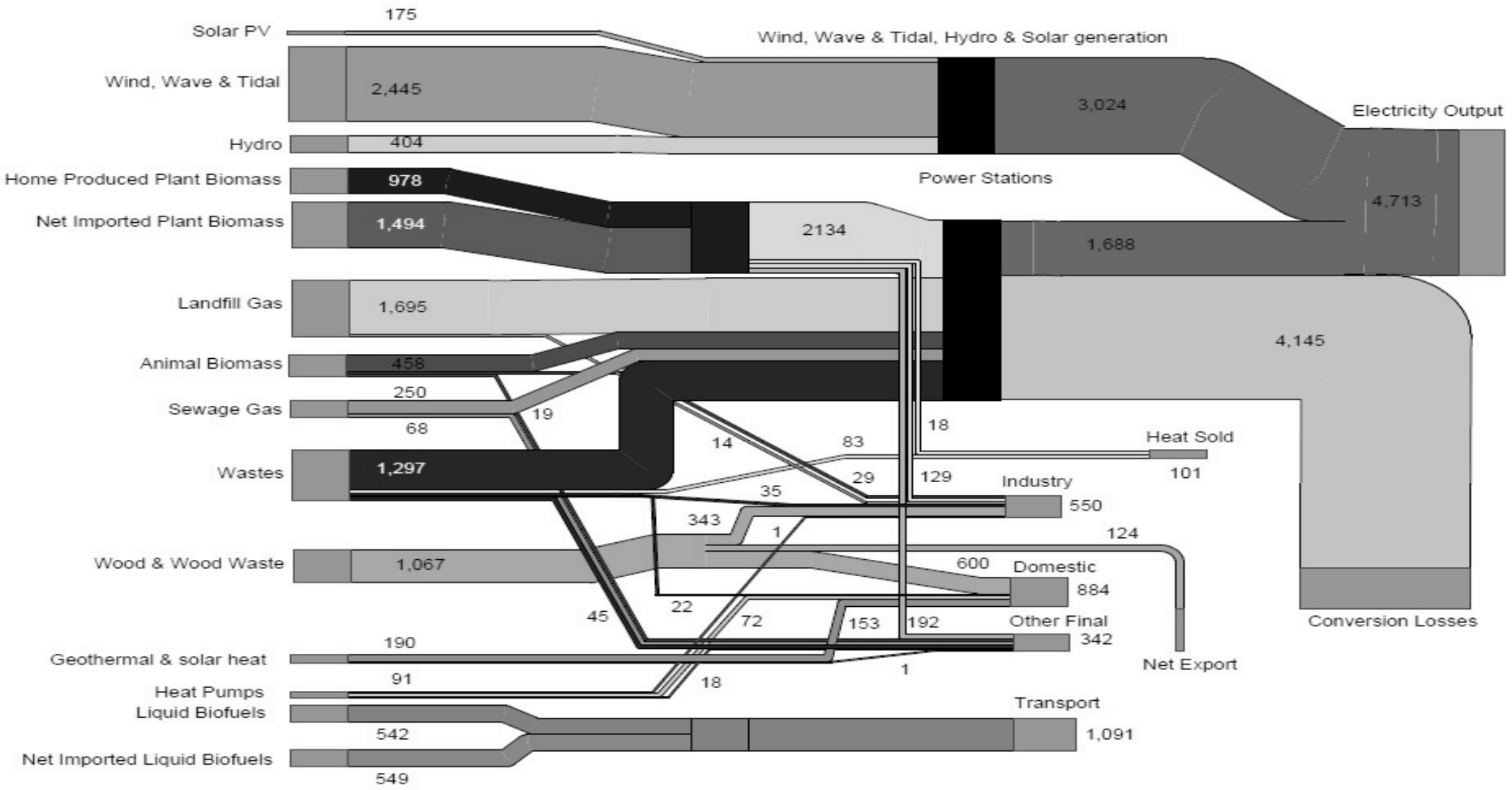
Key points

- Electricity generation from renewable sources increased by 30 per cent between 2012 and 2013, to reach 53.7 TWh. Capacity grew by 27 per cent (to 19.7 GW) over the same period (paragraphs 6.9 and 6.14; table 6.4).
- Offshore wind generation was 52 per cent higher than in 2012, with capacity up 23 per cent. Onshore wind generation was 40 per cent higher, with capacity up 27 per cent. Overall wind generation was 45 per cent higher and capacity 26 per cent higher (paragraphs 6.9 and 6.14; table 6.4).
- Generation from bioenergy sources was 24 per cent higher, partly due to the conversion of one of the units at Drax power station to dedicated biomass; however generation from hydro sources fell by 11 per cent (paragraph 6.9; table 6.4).
- 452 MW of renewable electricity capacity was added via Feed-in Tariffs during 2013, following the introduction of the FiT scheme in April 2010, taking total commissioned FiT capacity to 2,351 MW (paragraph 6.18).
- Load factors for wind in 2013 were the highest since 1998, due to high wind speeds, particularly in the final quarter of the year. The hydro load factor was down on 2012, and the lowest since 2010, due to low rainfall (paragraphs 6.25 and 6.26; table 6.5).
- The contribution of all renewables to UK electricity generation was 14.9 per cent in 2013, 3.6 percentage points higher than in 2012. However, using normalised load factors to take account of fluctuations in wind and hydro, the contribution of renewables to gross electricity consumption reduced to 13.9 per cent, up 3.1 percentage points on 2012 (table 6A).
- Heat from renewable sources increased by 19 per cent during 2013 (to 1,729 ktoe); and renewable biofuels for transport rose by 14 per cent (to 1,091 ktoe) (paragraphs 6.31 and 6.40; table 6.6).
- Progress has been made against the UK's 15 per cent target introduced in the 2009 EU Renewable Directive. Using the methodology set out in the Directive, provisional calculations show that 5.2 per cent of energy consumption in 2013 came from renewable sources; this is up from 4.2 per cent in 2012. There was a significant growth in the contribution of renewable electricity, while the renewable heating and transport contributions also rose. The UK's next interim target, for 2013 to 2014, is 5.41 per cent. (paragraph 6.43; table 6.7).

Introduction

6.1 This chapter provides information on the contribution of renewable energy sources to the United Kingdom's energy requirements. It covers the use of renewables to generate electricity, the burning of renewable fuels to produce heat, heat obtained from other renewable sources, and the use of liquid biofuels for transport. The chapter includes some 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 these wastes are still shown in the tables of this chapter but as "below the line" items.

Renewables flow chart 2013 (thousand tonnes of oil equivalent)



Note: This flow chart is based on data that appear in Tables 6.1 and 6.4

6.2 The data presented in this Chapter are drawn from the results of DECC surveys of electricity generators, information from CHP schemes, and an on-going study undertaken by Ricardo-AEA on behalf of DECC to update a database containing information on all relevant renewable energy sources in the United Kingdom.

6.3 The renewable energy flow chart summarises the flows of renewables from fuel inputs through to consumption for 2013. This is a way of simplifying the figures that can be found in the commodity balance for renewable energy sources in Table 6.1 and the renewable electricity output that can be derived from Table 6.4. 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.

6.4 Commodity balances for renewable energy sources covering each of the last three years form the first three tables in this chapter (Tables 6.1 to 6.3). Unlike the commodity balance tables in other chapters of the Digest, Tables 6.1 to 6.3 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, measurement, or differences between supply and demand. These balance tables are followed by 5-year tables showing capacity of, and electricity generation from, renewable sources (Table 6.4). Table 6.5 focuses on load factors for electricity generation. Table 6.6 shows renewable sources used to generate electricity, to generate heat, and for transport purposes in each of the last five years. Finally, Table 6.7 shows the UK's progress against the 2009 EU Renewable Energy Directive target.

6.5 In addition to the tables and commentary contained within this Digest, a long-term trends commentary and table (Table 6.1.1) covering the use of renewables to generate electricity, to generate heat, and as a transport fuel is available on the DECC section of the gov.uk website, accessible from the Digest of UK Energy Statistics home page:
www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes.
Quarterly table ET 6.1, showing renewable electricity generation and capacity by UK country, can be found at: www.gov.uk/government/publications/renewables-section-6-energy-trends

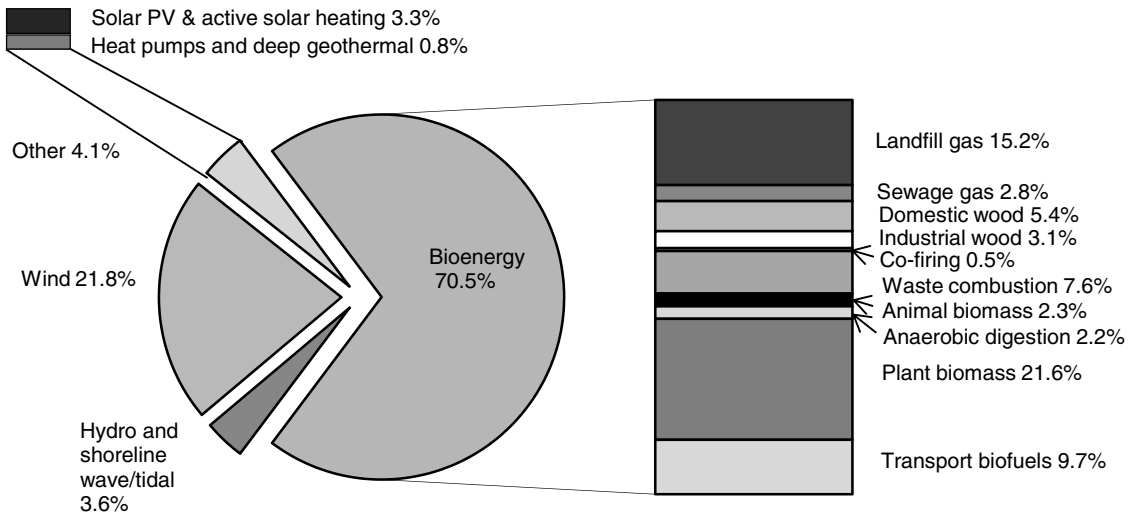
6.6 Also available on the web site is Table 6.1.2 which summarises all the renewable orders made under the Non Fossil Fuels Obligation (NFFO), Northern Ireland Non Fossil Fuels Obligation, and Scottish Renewables Orders (SRO), together with some descriptive text. As of this year, however, this will no longer be updated.

Commodity balances for renewables and waste in 2013 (Table 6.1), 2012 (Table 6.2) and 2011 (Table 6.3)

6.7 Twelve 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 and waste energy in input terms (around 70 per cent) is from bioenergy (excluding non-biodegradable wastes), with wind generation and hydro electricity production contributing the majority of the remainder as Chart 6.1 shows. Just 4.1 per cent of renewable energy comes from renewable sources other than biomass, wind and hydro. These include solar, heat pumps, and deep geothermal.

6.8 Three quarters of the 11,201 ktoe of renewable energy (excluding non-biodegradable wastes) consumed in 2013 was transformed into electricity. While bioenergy appears to dominate the picture when fuel inputs are being measured, hydroelectricity, wind power and solar together provide a larger contribution when the **output** of electricity is being measured as Table 6.4 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 5.74). However for landfill gas, sewage sludge, municipal solid waste and other bioenergy sources a substantial proportion of the energy content of the input is lost in the process of conversion to electricity as the flow chart (page 158) illustrates.

Chart 6.1: Renewable energy fuel use 2013 (1)



(1) Excludes all passive use of solar energy and all non-biodegradable wastes (626 ktoe). In this chart renewables are measured in primary input terms.
(2) Biomass co-fired with fossil fuels in power stations.
(3) 'Animal biomass' includes farm waste, poultry litter, and meat and bone combustion.
(4) 'Plant biomass' includes straw and energy crops.

Capacity of, and electricity generated from, renewable sources (Table 6.4)

6.9 Table 6.4 shows the capacity of, and the amounts of electricity generated from, each renewable source. Total electricity generation from renewables in 2013 amounted to 53,667 GWh, an increase of 12,453 GWh (30 per cent higher) on 2012. The largest absolute increase in generation came from onshore wind, rising by 4,880 GWh to 16,992 GWh, due to increased capacity and higher wind speeds across 2013. Similar factors helped offshore wind generation increase by 3,892 GWh to 11,441 GWh (52 per cent higher).

6.10 Generation from plant biomass rose by 4,850 GWh, to 8,933 GWh, more than double the previous year's contribution. This was due to the conversion of one of Drax (coal power station)'s six units to burn dedicated biomass, as well as increased generation from the Tilbury conversion (despite its closure under the Large Combustion Plant Directive in August 2013), following the fire in 2012. The conversion of the Drax unit, as well as Ironbridge, resulted in a further reduction (1,474 GWh) in the co-firing of renewables with fossil fuels. Total generation from bioenergy sources as a whole was 24 per cent higher than in 2012.

6.11 Greater uptake of solar photovoltaics, particularly from larger schemes supported by the Renewables Obligation (RO), as well as smaller schemes under the Feed in Tariff (FiT) scheme, led to generation in 2013 increasing by over one half on 2012 (by 685 GWh, from 1,351 GWh to 2,036 GWh). Other sources showing increases during the year included anaerobic digestion (an increase of 208 GWh, 42 per cent higher), sewage gas (42 GWh, 5.8 per cent higher), and landfill gas (15 GWh, 0.3 per cent higher). Generation from hydro fell by 587 GWh (11 per cent) due to reduced rainfall, while biodegradable waste (by 46 GWh, 2.3 per cent) and animal biomass (by 14 GWh, 2.2 per cent) also fell.

6.12 Onshore wind continued to be the leading individual technology for the generation of electricity from renewable sources during 2013, with 32 per cent of renewables generation coming from this source; a further 21 per cent came from offshore wind, and 8.8 per cent came from hydro. However the combined generation from the variety of different bioenergy sources accounted for 34 per cent of renewable generation, with plant biomass accounting for almost one half of bioenergy generation and

landfill gas accounting for 28 per cent. Despite the large annual increase in capacity, just 3.8 per cent of renewable generation came from solar photovoltaics.

6.13 Renewable sources provided 14.9 per cent of the electricity generated in the United Kingdom in 2013 (measured using the "international basis", i.e. electricity generated from all renewables except non-biodegradable wastes as a percentage of all electricity generated in the UK), 3.6 percentage points higher than the proportion recorded during 2012. Table 6A and Chart 6.2 show the growth in the proportion of electricity produced from renewable sources. The table also includes the progress towards the electricity renewables target set under the RO (see paragraphs 6.56 to 6.58), and progress towards the 2009 Renewable Energy Directive (see paragraph 6.52).

Table 6A: Percentages of electricity derived from renewable sources

	2009	2010	2011	2012	2013
Overall renewables percentage (international basis)	6.7	6.8	9.4	11.3	14.9
Percentage on a Renewables Obligation basis	6.7	6.9	9.4	10.8	14.1
Percentage on a 2009 Renewable Energy Directive basis (normalised)	6.7	7.4	8.8	10.8	13.9

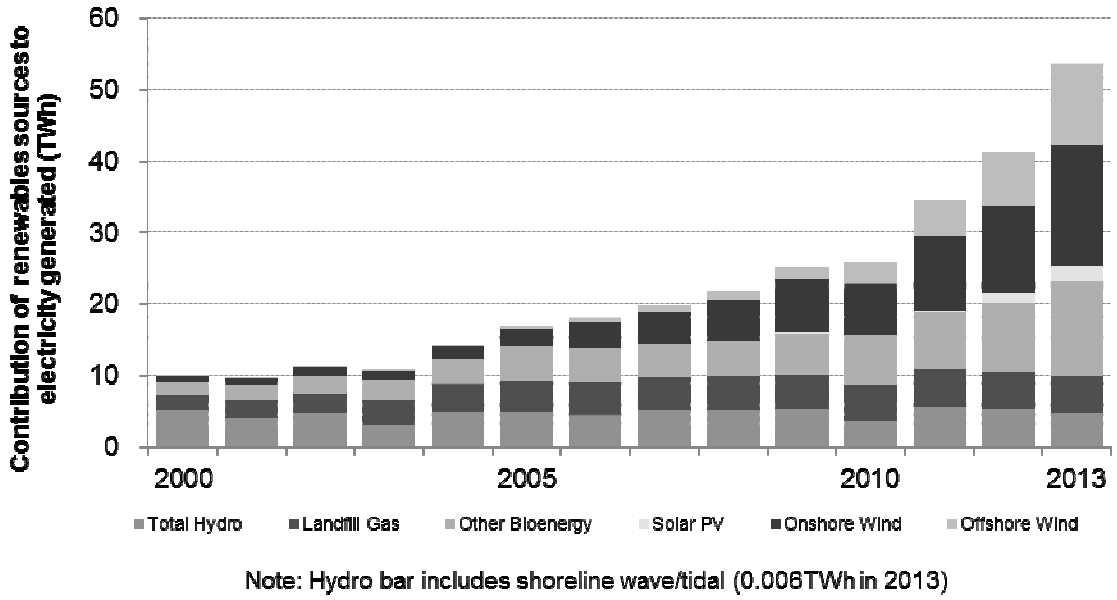
6.14 Installed generation capacity reached 19,690 MW at the end of 2013, an increase of 4,200 MW (27 per cent) during the year; this excludes the capacity within conventional generation stations that was used for co-firing (a further 35 MW). The largest contributor towards the increase was 1,614 MW from onshore wind, with a further 1,033 MW from solar photovoltaics, 845 MW from bioenergy and 701 MW from offshore wind.

6.15 Onshore wind capacity grew from 5,899 MW in 2012 to 7,513 MW in 2013, with several new wind farms opening or being completed, the largest being the 144 MW Fallago Rig in Scotland. Solar PV capacity increased from 1,747 MW to 2,780 MW, with around half of this increase from smaller-scale sites confirmed on, or eligible, for FiTs, and the other half from large-scale sites accredited on, or awaiting accreditation on, the RO.

6.16 Capacity from the variety of bioenergy technologies increased from 3,156 MW in 2012 to 4,002 MW in 2013, with the extra capacity from two new conversions to plant biomass (Drax unit one and Ironbridge) exceeding the reduction from the closure of Tilbury during the year. Offshore wind capacity increased from 2,995 MW to 3,696 MW, a result of the completion of the 630 MW London Array and 270 MW Lincs wind farms, as well as the opening of Teesside (62 MW) and the first 43 MW of capacity being installed at Gwynt-y-Mor.

6.17 In capacity terms, onshore wind was the leading technology at the end of 2013, accounting for 38 per cent of capacity, followed by offshore wind (19 per cent), solar photovoltaics (14 per cent) and hydro (8.6 per cent). Bioenergy represented 20 per cent of capacity, with the main components being plant biomass (9.9 per cent) and landfill gas (5.3 per cent).

Chart 6.2: Electricity generation by main renewable sources since 2000



6.18 During the first nine months (April and December 2010) of the FiT scheme, a total of 69 MW of renewable capacity was installed and subsequently confirmed on it. During 2011, a further 952 MW of FiT supported renewable capacity was installed. For 2012, 840 MW of capacity was added. In 2013, a further 452 MW of capacity was installed, with 83 per cent of this new capacity coming from solar photovoltaics (PV). A further 63 MW of solar PV capacity was installed in 2013 and awaiting accreditation on FiTs. Despite the majority of the increase in FiTs capacity in 2013 coming from solar PV, this (375 MW) was lower than 2012 (705 MW).

6.19 The greatest increase in FiT capacity in percentage terms in 2013 was from anaerobic digestion, from 49 MW at the end of 2012 to 68 MW at the end of 2013, while hydro capacity increased from 40 MW to 46 MW and onshore wind from 161 MW to 214 MW. At the end of 2013, solar PV represented 86 per cent of commissioned FiTs capacity (down from 87 per cent at the end of 2012), with onshore wind 9.1 per cent (up from 8.5 per cent), hydro 2.0 per cent (down from 2.1 per cent) and anaerobic digestion 2.9 per cent (up from 2.6 per cent). It should be noted that, due to administrative lags of around three months, much capacity installed towards the end of 2013 was not confirmed until the first quarter of 2014 (so the amount of capacity installed under FiTs at the end of 2013 will not equal the amount actually confirmed on the Central FiTs Register).[1]

6.20 Table 6B shows the number of sites generating renewable electricity at the end of 2013, showing there were around half a million sites, although this figure is dominated by small-scale solar PV installations confirmed on FiTs.

6.21 Chart 6.3 illustrates the continuing increase in the electricity generation capacity from all significant renewable sources since 2000. This upward trend in the capacity of renewable sources should continue as recently consented onshore and offshore wind farms and other projects come on stream. The map, shown on page 163, shows the location of wind farms in operation at the end of December 2013, together with an indication of the capacity.

[1] At the end of 2013, 2,351 MW of renewable capacity was commissioned and subsequently confirmed on the Central FiTs Register. This includes 37 MW commissioned prior to the start of FiTs on 1 April 2010.

The Location of Wind Farms in the United Kingdom as at 31 December 2013

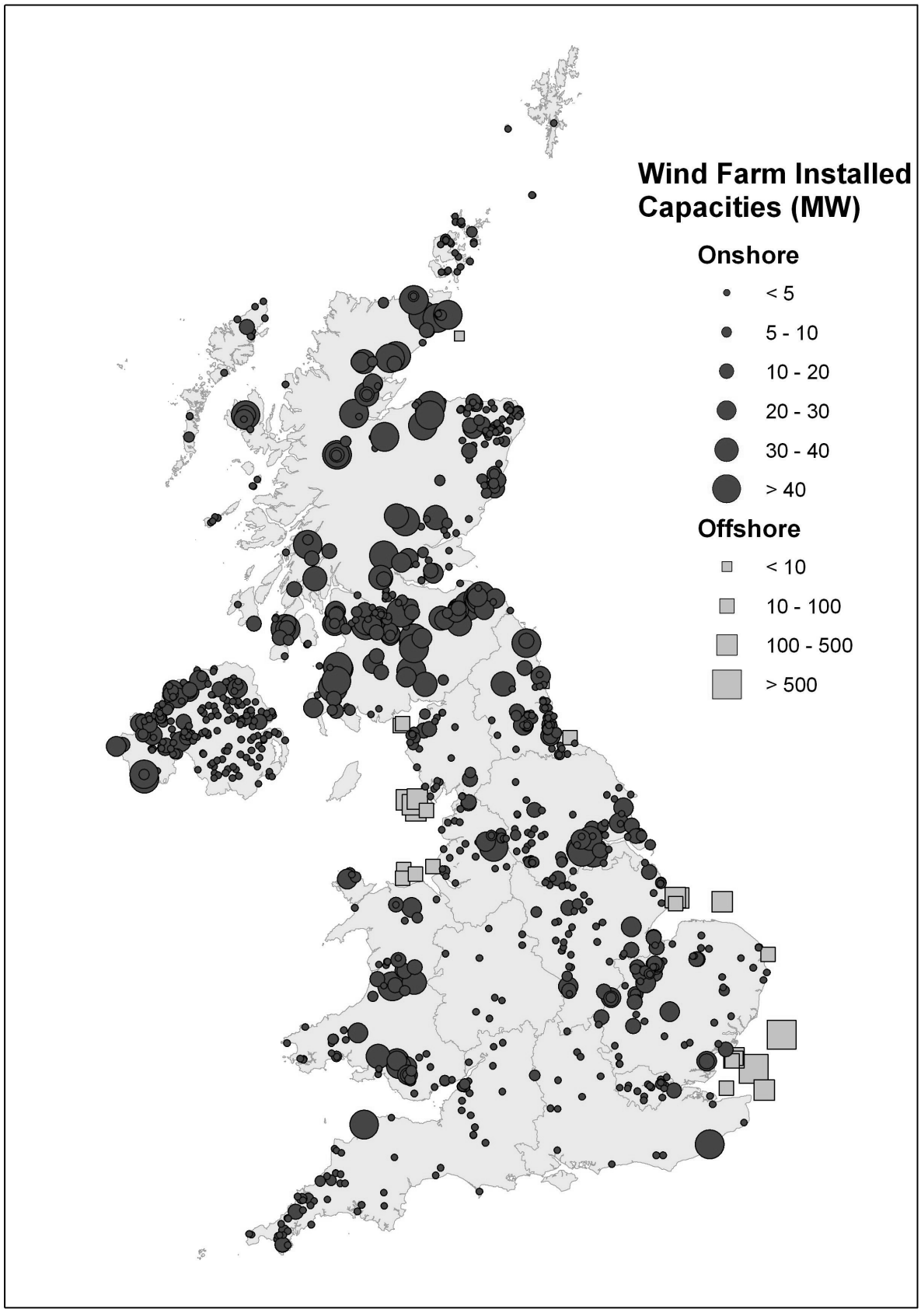
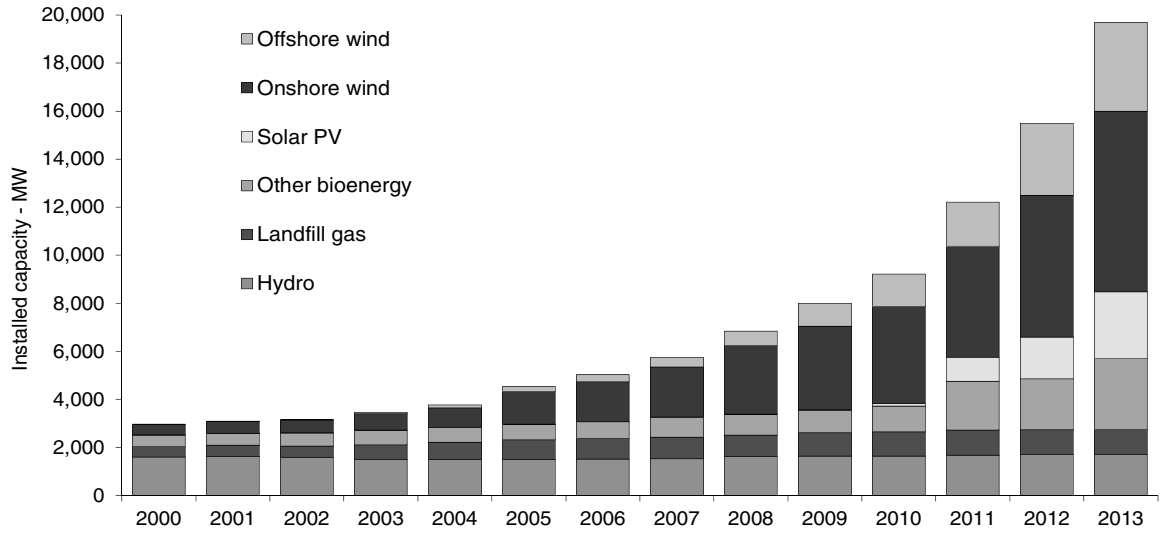


Table 6B: Number of sites generating renewable electricity, as at end of December 2013 (excluding co-firing)[2]

	FiTs confirmed	Other sites	TOTAL
Onshore Wind	5,307	1,532	6,839
Offshore Wind	-	25	25
Marine energy	-	10	10
Solar PV	456,097	52,230	508,327
Hydro	452	380	832
Landfill gas	-	435	435
Sewage sludge digestion	-	186	186
Energy from waste	-	32	32
Animal biomass (non-AD)	-	6	6
Anaerobic digestion	84	96	180
Plant biomass	-	115	115
TOTAL	461,940	55,047	516,987

Chart 6.3: Electrical generating capacity of renewable energy plant since 2000



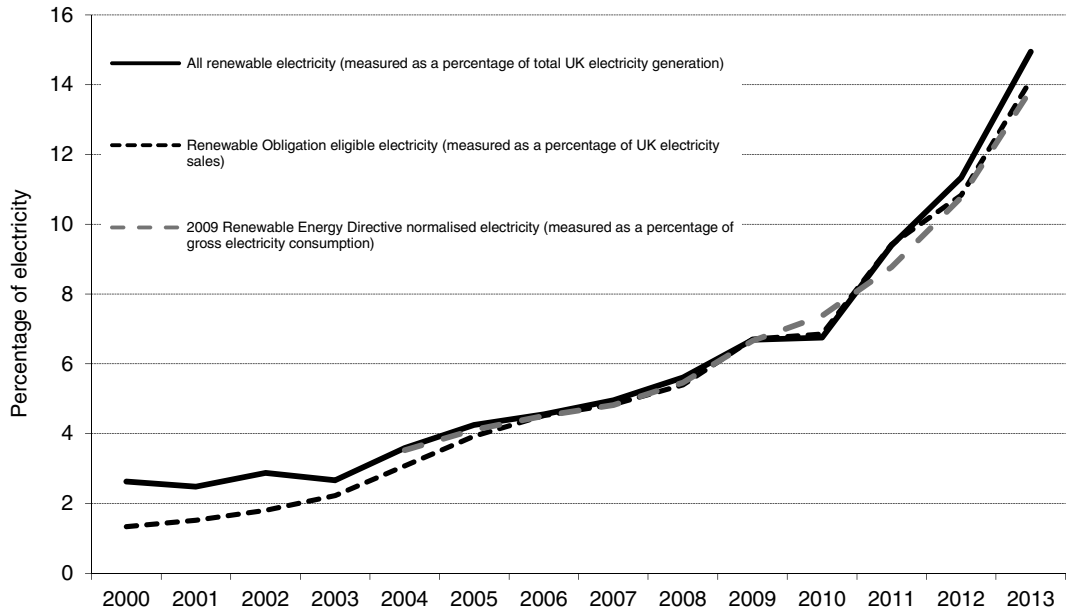
(1) All waste combustion plant is included because both biodegradable and non-biodegradable wastes are burned together in the same plant.
(2) Hydro includes both large scale and small scale, and shoreline wave and tidal (7.2 MW in 2013).

6.22 Electricity generated in the UK from renewable sources eligible for the RO, and claiming Renewable Obligation Certificates (ROCs) in 2013 was 30 per cent greater than in 2012; this compares with 15 per cent growth in 2012, the higher growth rate in 2013 due to increased capacity under the RO, particularly the new biomass conversions, and higher wind speeds than in 2012. Chart 6.4 includes a line showing the growth in the proportion of electricity produced from renewable sources claiming ROCs in addition to the International definition and the definition used to monitor the electricity component of the 2009 Renewable Energy Directive. Table 6A shows electricity eligible for and claiming ROCs as a percentage of electricity sales. RO supported generation has increased by 37 TWh since its introduction in 2002, an increase of over five times [3]. This compares with an all-renewable electricity generation figure that has increased by 43 TWh (almost three times) over the same period, but from a higher starting level.

[2] The number of sites (as with overall capacity) is subject to revision, due to lags in data sources. This particularly affects solar PV, where more sites may have come online since compiling this edition of DUKES.
[3] A small amount is due to existing hydro stations being refurbished and thus becoming within the scope of the RO definition, as opposed to new capacity being installed.

6.23 As shown in Table 6A, during 2013 renewable generation measured using the RO basis (i.e. as a proportion of electricity sales by licensed suppliers) increased to 14.1 per cent. Since the introduction of the RO in 2002, generation from wind has increased on average by around one-third each year, with year-on-year increases ranging from 2 per cent to 52 per cent.

Chart 6.4: Growth in electricity generation from renewable sources since 2000



Load factors for electricity generated from renewable sources (Table 6.5)

6.24 Plant load factors in Table 6.5 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. The method can be expressed as:

$$\frac{\text{Electricity generated during the year (kWh)}}{\text{(Installed capacity at the beginning of the year + Installed capacity at the end of the year (kW))} \times 0.5 \times \text{hours in year}}$$

6.25 A key influence on load factors of renewable technologies is the weather, with rainfall being the key driver behind the availability of hydro. In 2013, average rainfall levels (in hydro catchment areas) were 9.2 per cent lower than in 2012; as a consequence, the load factor of hydro schemes fell to 31.7 per cent. This was the second successive fall in the annual load factor, with the load factor falling to 35.8 per cent in 2012 from a record high of 39.2 per cent in 2011, as a result of rainfall levels falling by 24 per cent. This followed a record low of 24.9 per cent in 2010, the driest year since 2003.

6.26 Average wind speeds during 2013 (at 8.6 knots) were 0.4 knots higher than in 2012; although broadly similar to the average over the last five years, it was the windiest December (which is the month in the year when the most installed capacity is operational) in the last 13 years. This resulted in the highest onshore wind load factor since 1998, at 28.9 per cent, an increase of 2.7 percentage points on 2012. In 2012, the onshore wind load factor, at 26.2 per cent had fallen by 1.0 percentage point on 2011, with average wind speed 0.8 knots lower. Wind speeds in 2011 were around 1.3 knots higher than in 2010, with load factors increasing to 27.2 per cent, from 2010's record low load factor of

21.7 per cent (which was due to the lowest average wind speeds this century, at 7.8 knots). Other factors, such as improved design can also impact on load factors. Load factors for all non-renewable generating plant in the UK are shown in Chapter 5, Table 5.09.

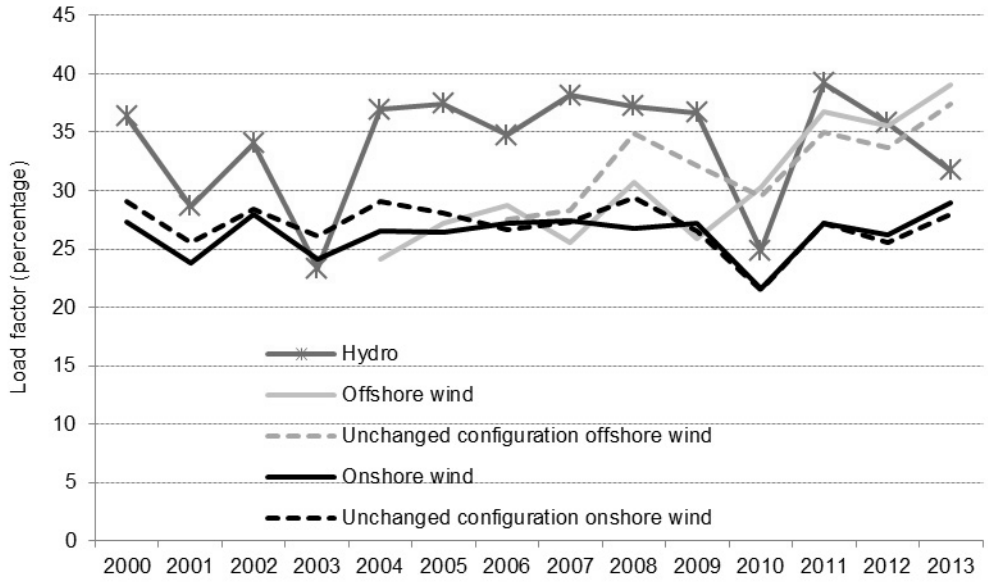
6.27 Change in capacity during the year can also affect load factors calculated using this methodology. Over recent years, this has particularly impacted on wind technologies. As an indication of the impact that new capacity can have on load factors, the first half of operational offshore wind capacity at London Array (313 MW) that was on line at the end of 2012 had the impact of reducing the offshore wind load factor by 0.6 percentage points in 2012, since not all of this would have generated, and only over the final three months of the year, but its capacity has an impact on the denominator of the calculation for the whole year. During 2011, the conversion of Tilbury B's previously coal-fired power station to dedicated biomass in December 2011 reduced the plant biomass load factor by around one half as the 750 MW capacity only contributed to renewable generation for less than one month. Similarly the large increase in solar PV capacity towards the end of 2010 and 2011 reduced the load factors for this technology.

6.28 To compensate for these factors, a second "unchanged configuration" set of statistics have been calculated for many technologies and included in Table 6.5. These statistics use the same methodology as the other load factor statistics, but are restricted to those schemes that have operated continuously throughout the year without a change in capacity. One of the inputs to the unchanged configuration calculation is data on issued ROCs, and a site is included in the calculation only if it has been issued ROCs for each month during the calendar year. The formula for calculating the unchanged configuration load factors is:

$$\frac{\text{Electricity generated during the year (kWh)}}{\text{Installed capacity operating throughout the year with unchanged configuration (kW) x hours in year}}$$

6.29 Chart 6.5 shows load factors for wind and hydro. The impacts of new capacity and changes in weather conditions – referred to in the preceding paragraphs - can be identified.

Chart 6.5: Load factors for renewable electricity generation



Renewable sources used to generate electricity, heat, and for transport fuels (Table 6.6)

Renewable electricity

6.30 Between 2012 and 2013, there was an increase of 22 per cent in the **input** of renewable sources into electricity generation, to 8,381 ktoe. The combined contribution of on-shore and off-shore wind increased by 45 per cent, bioenergy sources increased by 16 per cent, whilst hydro fell by 11 per cent.

Renewable heat

6.31 Table 6.6 also shows the contribution from renewables to heat generation. Around 15 per cent of renewable sources were used to generate heat in 2013, around the same proportion as in 2012. Energy used for all renewable heat sources increased by 19 per cent during 2013, from 1,451 ktoe to 1,729 ktoe. Around three per cent of renewable heat was supported by the Renewable Heat Incentive (RHI) or Renewable Heat Premium Payment (RHPP) during 2013 (50 ktoe, or 586 GWh). Further information on the RHI and RHPP schemes can be found in paragraphs 6.67 to 6.68.

6.32 Of the 278 ktoe increase in renewables used for heat in 2013, the largest contributor was domestic use of wood, which increased by 93 ktoe (18 per cent), partly due to increased sales of wood burning stoves and fires, and partly due to more heating degree days in 2013 (an average of 6.2 per day, compared with 6.0 in 2012) (see paragraph 6.97 for information on degree days adjustment), as a result of a slightly colder heating season.

6.33 Plant biomass used for heat was the next largest contributor to the increase in renewables used for heat, increasing by 64 ktoe (23 per cent), mainly due to increased capacity of biomass-fuelled CHP plant in 2013. Non-domestic use of wood increased by 53 ktoe (18 per cent), due to increased deployment under the RHI. Between 2012 and 2013, bioenergy use as a whole increased by 18 per cent, from 1,230 ktoe to 1,448 ktoe (and a one and a half times increase since 2005). Renewable heat from active solar thermal increased by one quarter, from 152 ktoe in 2012 to 190 ktoe in 2013.

6.34 Renewable energy from heat pumps increased by one third in 2013, from 68 ktoe to 91 ktoe, with 59 per cent of this heat coming from air source heat pumps. The total installed capacity of ground source heat pumps, ambient air to water heat pumps, and exhaust air heat pumps meeting the minimum SPF was estimated to be 963 MW at the end of 2013. The capacity installed during 2013 was assumed to be installed at a steady rate throughout the year. To note that only the net gain in energy from heat pumps (i.e. total heat energy minus the electricity used to power the pump) is counted as renewable energy (see paragraph 6.92 for details on the methods used).

6.35 Domestic use of wood is the main contributor to renewables used for heat – comprising around 35 per cent of the renewable heat total. Non-domestic use of wood and wood waste, and plant biomass formed the next largest components, at around 20 per cent each. Non-bioenergy renewable heat sources include solar thermal, deep geothermal and heat pumps, and combined these accounted for 16 per cent of renewable heat in 2013.

Liquid Biofuels for transport

6.36 Biodiesel and bioethanol consumption figures have been obtained from data published by HM Revenue and Customs (HMRC) derived from road fuel taxation statistics, available in the Hydrocarbon Oils Duties bulletin, at: www.uktradeinfo.com/Statistics/Pages/TaxAndDutybulletins.aspx

6.37 The HMRC figures show that 766 million litres of biodiesel were consumed in 2013, around 21 per cent higher than in 2012.[4] Credits under the Renewable Transport Fuel Obligation (RTFO) were doubled from January 2012 for some types of biodiesel (such as waste cooking oil), meaning that less was needed to be blended with diesel, which had resulted in a fall in consumption in 2012. It is estimated that 300 million litres of biodiesel were produced in the UK in 2013, around 7 per cent higher than in 2012. Of this, about 8 million litres are known to have been used for non-transport applications or exported. Therefore, at least 474 million litres of biodiesel were imported in 2013. The

[4] The most usual way for biodiesel to be sold is for it to be blended with ultra-low sulphur diesel fuel.

total annual capacity for biodiesel production in the UK in 2013 is estimated to be around 594 million litres.

6.38 HMRC data also shows that 819 million litres of bioethanol was consumed in the UK in 2013, an increase of 5.8 per cent on 2012. The UK capacity for bioethanol production at the end of 2013 was estimated to be around 905 million litres, although actual production was estimated to be 524 million litres, 58 per cent of capacity. Of UK production, 64 million litres was known to be used for non-transport applications, or exported, so at least 360 million litres was imported.

6.39 During 2013, biodiesel accounted for 2.8 per cent of diesel, and bioethanol 4.5 per cent of motor spirit. The combined contribution of liquid biofuels for transport was 3.5 per cent, an increase of 0.4 percentage points on 2012.

6.40 The HMRC data have been converted from litres to tonnes of oil equivalent and the data are shown in both the commodity balances (Tables 6.1 to 6.3) and in Table 6.6. In addition these data are also included in the aggregate energy balances (Tables 1.1 to 1.3). The tables show the contribution that liquid biofuels are making towards total renewable sourced energy. Renewable biofuels used for transport rose by 14 per cent (to 1,091 ktoe) between 2012 and 2013, accounting for 3.5 per cent by volume of road transport fuels in 2013. In 2013, liquid biofuels for transport comprised around 10 per cent of total renewable sources, similar to the contribution in 2012, although down from a high of 16 per cent in 2010.

6.41 When measuring the contribution of transport biofuels for the Renewable Energy Directive, only those meeting sustainability criteria count. The HMRC data referred to above do not contain sustainability information, so data from the RTFO are used to identify the quantity of sustainable biofuels – including those which carry a higher weighting in the transport-specific measure. However, for the latest year, as complete RTFO sustainability data are not yet available, HMRC data are used; this will be replaced with RTFO data when the complete dataset becomes available later in the year. During RTFO obligation period 5, from April 2012 to April 2013, 99.6 per cent of transport biofuel consumption was demonstrated to be sustainable. Under the RTFO, 1,654 million litres of transport biofuels were consumed in 2013 (although, as at May 2014, only 82 per cent of this had been accredited with Renewable Transport Fuel Certificates (RTFCs)). Further information on the RTFO is given in paragraphs 6.64 to 6.66.

Renewable sources data used to indicate progress under the 2009 EU Renewable Energy Directive (RED) (Table 6.7)

6.42 The 2009 Renewable Energy Directive (RED) has a target for the UK to obtain 15 per cent of its energy from renewable sources by 2020. The target uses a slightly different definition of renewable and total energy than is used in the rest of the Digest, including the use of 'normalised' wind and hydro generated electricity. Further details on the RED methodology can be found in paragraphs 6.53 and 6.54.

6.43 Table 6.7 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, and also shows the proportions of electricity, heat and transport energy coming from renewable sources. These provisional figures indicate that during 2013, 5.2 per cent of final energy consumption was from renewable sources. This is an increase from the 2012 figure of 4.2 per cent, and 3.8 per cent in 2011. The RED introduced interim targets for member states to achieve on their route to attaining the 2020 proportion. The UK was broadly in line with its first interim target of 4.04 per cent across 2011-2012, achieving 4.01 per cent. The second interim target, across 2013 and 2014, is 5.41 per cent, and provisional data on progress against this target will be available in June 2015.

6.44 Overall renewable sources, excluding non-biodegradable wastes and passive solar design (see paragraph 6.69), provided 5.2 per cent of the United Kingdom's total primary energy requirements in 2013 (excluding energy products used for non-energy purposes). This is a different measure to that reported in the RED. The primary energy demand basis typically 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, so 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, then the gross final energy consumption percentage will overtake the primary energy demand percentage. Both of these percentage measures are directly influenced by overall energy use: for instance, whilst the renewable energy component (the numerator in the RED calculation) increased by 24 per cent, the final consumption denominator increased by 1 per cent. Table 6C shows both measures.

Table 6C: Percentages of energy derived from renewable sources

	2009	2010	2011	2012	2013
Eligible renewable energy sources as a percentage of capped gross final energy consumption (ie the basis for the Renewable Energy Directive)	3.0	3.3	3.8	4.2	5.2
Renewable energy as a percentage of primary energy demand	3.1	3.3	4.0	4.3	5.2

6.45 Eurostat publishes data on how all countries are progressing towards their RED (final and interim) targets. The latest comparative data relates to 2012. The 2012 RED percentage for all EU countries combined was 14.1 per cent, but with wide variation amongst member states, from 1.4 per cent in Malta to 51.0 per cent in Sweden.

6.46 Since 2004, the share of renewable energy in final energy consumption grew in all Member States. The data also shows that, in 2012, the UK had the third lowest RED percentage, with Malta and Luxembourg having lower percentages. The largest increases during this period were recorded in Sweden (from 38.7 per cent in 2004 to 51.0 per cent in 2011), Denmark (from 14.5 per cent to 26.0 per cent), Austria (from 22.7 per cent to 32.0 per cent), Italy (5.7 per cent to 13.5 per cent), and Estonia (from 18.4 per cent to 25.8 per cent). The UK showed a 3.0 percentage point increase over the same time period.

6.47 From 2012, the UK had the largest challenge to meet its 2020 target (a further 10.8 percentage point increase is required to achieve its 15 per cent target), followed by France (a further 9.6 percentage points are required to achieve the 23 per cent target). In 2011, Estonia became the first country to exceed its (25 per cent) 2020 target, and was joined in 2012 by Sweden and Bulgaria (exceeding their 2020 targets of 49 per cent and 16 per cent). Further details of progress for all member states can be found at:
http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/8-10032014-AP/EN/8-10032014-AP-EN.PDF

Technical notes, definitions, and policy context

6.48 The RESTATS study started in 1989 and, where possible, information was collected on the amounts of energy derived from each renewable source. Additional technologies have been included for more recent years, such as the inclusion of energy from heat pumps from 2008 onwards and the recording of technology types such as anaerobic digestion. This technical notes section defines these renewable energy sources. The database now contains 25 years of data from 1989 to 2013. Information within RESTATS is also combined with supplementary data obtained from monitoring the planning process for new renewable electricity and heat installations to ensure that it is more comprehensive.

6.49 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. Some data are also collected via other methods, such as desk research and data from the administration of renewable energy policies. Further details about the data collection methodologies used in RESTATS are also contained in a guidance note on the DECC section of the gov.uk website at:
www.gov.uk/government/collections/renewables-statistics#methodology

6.50 Energy derived from renewable sources is included in the aggregate energy tables in Chapter 1 of this Digest. The main commodity balance tables (Tables 6.1 to 6.3) present figures in the common unit of energy, the tonne of oil equivalent, which is defined in Chapter 1 paragraph 1.29. The gross calorific values and conversion factors used to convert the data from original units are given in 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 5.74). 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 6.115).

6.51 The various renewable energy Directives, policies and technologies are described in the following paragraphs. This section also provides details of the quality of information provided within each renewables area, and the methods used to collect and 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 section of the gov.uk website.

European and UK Renewable Energy Policy Context

EU Renewable Enery Directive

6.52 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. In 2009 a new Renewable Energy Directive (Directive 2009/29/EC) ('RED') was implemented on this basis and resulted in agreement of country "shares" of this target. For the UK, its share is that 15 per cent of final energy consumption - calculated on a net calorific value basis, and with a cap on fuel used for air transport - should be accounted for by energy from renewable sources by 2020. The RED included interim targets, and required each Member State to produce a National Renewable Energy Action Plan (which contains a progress trajectory and identifies measures which will enable countries to meet their targets). The Directive also requires each Member State to submit a report to the Commission on progress in the promotion and use of energy sources every two years. The UK's action plan and the first two progress reports (covering performance during 2009-2010 and 2011-12) are available at:
www.gov.uk/government/uploads/system/uploads/attachment_data/file/47871/25-nat-ren-energy-action-plan.pdf, www.gov.uk/government/publications/first-progress-report-on-the-promotion-and-use-of-energy-from-renewable-sources-for-the-uk, and

www.gov.uk/government/publications/second-progress-report-on-the-promotion-and-use-of-energy-from-renewable-sources-for-the-united-kingdom

6.53 The RED uses different measures of both renewables and overall energy from those elsewhere in the Digest. The renewable numerator in the calculation uses 'normalised' wind and hydro generated electricity – combined with other actual electricity generated from other sources, energy for heating and cooling by final consumers, as well as the use of energy for transport purposes. Gross final energy consumption (which is calculated on a net calorific value basis) also 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. The normalisation process is carried out by calculating generation by applying an average load factor to current capacity. For wind, the load factor is calculated as the average of the past five years (including the present one), with current capacity taken as an average of the start and end of year capacity. For hydro, the load factor is the average of the past 15 years, applied to capacity at the end of the current year. The generation figures obtained from this procedure replace the actual generation figures for wind and hydro in the Directive calculation. Additionally, the Directive includes a cap on the proportion that air transport can contribute to the total; this cap is currently 6.18 per cent; certain fuels also receive a higher weighting in the calculation, with full details being set out in the Directive, which is available at:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:EN:PDF.

6.54 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 2013 have been calculated on a net calorific value basis and are available in Table I.1 at:
www.gov.uk/government/publications/energy-chapter-1-digest-of-united-kingdom-energy-statistics-dukes

UK Renewables Policy

6.55 The UK's progress report details the key policies and measures undertaken or in planning, to further increase renewables deployment. These include:

- Putting in place appropriate financial incentives to bring forward and support the take-up of renewable energy, including the "banded" Renewables Obligation, Feed-in Tariffs (FiTs) for small scale (under 5 MW) electricity generation, the Renewable Transport Fuel Obligation, the Renewable Heat Incentive tariff scheme (for industry, commercial premises, the public sector, and, since April 2014, households), and the (now closed) Renewable Heat Premium Payment Scheme (for households); and, from 2017, Contracts for Differences under Electricity Market Reform.
- Identifying and removing the most significant non-financial barriers to renewables deployment, including measures to improve existing grid connection arrangements; and
- Overcoming supply chain blockages and promoting business opportunities in the renewables sector in the UK.

More details of the main renewable technologies that either have the greatest potential to help the UK meet the 2020 RED target in a cost effective and sustainable way, or offer the greatest potential for the decades that follow, can be found in the UK Renewable Energy Roadmap, which was first published in July 2011, and updated in 2012 and 2013, available at:

www.gov.uk/government/publications/renewable-energy-roadmap
www.gov.uk/government/publications/uk-renewable-energy-roadmap-update
www.gov.uk/government/publications/uk-renewable-energy-roadmap-second-update

Renewables Obligation (RO)

6.56 In April 2002 the Renewables Obligation (RO) came into effect[5]. It is an obligation on electricity suppliers to source a specific and annually increasing proportion of electricity from eligible renewable sources or pay a penalty. The proportion is measured against total electricity sales (as shown in Table 5.5 contained in the electricity chapter of this Digest). The Obligation is intended to incentivise an increase in the level of renewable generating capacity and so contribute to our climate change targets. Examples of RO eligible sources include wind energy, wave and tidal energy, landfill gas, sewage gas, deep geothermal, hydro, photovoltaics, energy from waste, biomass, energy crops and anaerobic digestion. Ofgem (which administers the RO) issues Renewables Obligation Certificates (ROCs) to qualifying renewable generators. These certificates may be sold by generators directly to licensed electricity suppliers or traders. Suppliers present ROCs to Ofgem to demonstrate their compliance with the obligation.

6.57 When the Obligation was first introduced, 1 ROC was awarded for each MWh of renewable electricity generated. In 2009, 'banding' was introduced into the RO, meaning different technologies now receive different numbers of ROCs depending on their costs and potential for large scale deployment; for example offshore wind receives 2 ROCs/MWh while onshore wind receives 0.9 ROCs/MWh. The more established renewable technologies such as sewage gas receive 0.5 ROCs/MWh. A review of the bands across the UK concluded in 2012 and set the level of support under the RO from 1 April 2013 – 31 March 2017 (with the exception of offshore wind for which new bands will come in on 1 April 2014). Banding reviews ensure that, as market conditions and innovation within sectors change and evolve, renewables developers continue to receive the appropriate level of support necessary to maintain investments within available resources. The RO will close to new schemes on 31 March 2017, although existing schemes will continue to receive support until 2037. A list of technologies eligible for the RO, details of the RO banding review, and the level of ROCs received, is available at: www.gov.uk/calculating-renewable-obligation-certificates-rocs

6.58 Table 6.4 contains a row showing the total electricity eligible for the RO. Prior to 2002 the main instruments for pursuing the development of renewables capacity were the Non Fossil Fuel Obligation (NFFO) Orders for England and Wales and for Northern Ireland, and the Scottish Renewable Orders. Statistics of these Orders can now be found in Table 6.1.2 on the DECC section of the gov.uk website (see paragraphs 6.5 and 6.6).

Electricity Market Reform (EMR)

6.59 EMR will replace the RO for new schemes from April 2017 (although new renewable schemes will have a choice between this and the RO between the beginning of EMR in mid-2014 and the RO's closure at the end of March 2017). The reforms tackle the risks and uncertainties of the underlying economics of different forms of electricity generation by offering long term contracts for low carbon energy (Contracts for Differences).

6.60 Companies will get, in effect, a fixed and secure price at which they can sell their electricity to consumers. This will allow investors to be confident about the returns of their capital in advance of investing billions into new infrastructure schemes. It will also encourage banks to lend at cheaper rates because the projects are less risky. Further details of the reforms are available at: www.gov.uk/government/policies/maintaining-uk-energy-security--2/supporting-pages/electricity-market-reform

Feed-in Tariffs (FiTs)

6.61 Feed-in tariffs are a financial support scheme for eligible low-carbon electricity technologies, aimed at small-scale installations with a capacity of less than 5 Megawatts (MW). FiTs support new anaerobic digestion (AD), solar photovoltaic (PV), small hydro and wind, by requiring electricity suppliers to make payments (generation tariffs) to these generators based on the number of kilowatt hours (kWh) they generate. An additional guaranteed export tariff is paid for electricity generated that

[5] Parliamentary approval of the Renewables Obligation Orders under The Utilities Act 2000 was given in March 2002. The Renewables Obligation covering England and Wales and the analogous Renewables (Scotland) Obligation came into effect in April 2002. Northern Ireland introduced a similar Renewables Obligation in April 2005. 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.

is not used on site and exported to the grid. The scheme also supports micro combined heat and power installations with an electrical capacity of 2kW or less, as a pilot programme.

6.62 PV installations increased rapidly at the start of the FIT scheme. The rate of increase slowed significantly after August 2012 following tariff reductions introduced after a comprehensive review of the scheme. A degression mechanism was also introduced following the comprehensive review. This cost control mechanism allows solar PV tariffs to decrease every 3 months (depending on deployment levels). Tariffs for Non-PV technologies degress every year (with a six-month contingent degression if deployment is high in the first half of the year).

6.63 Tariff changes implemented as a result of the review only affect new entrants to the scheme. Policy information and statistical reports relating to FiTs can be found at: www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/feed-in-tariffs-scheme and www.gov.uk/government/organisations/department-of-energy-climate-change/series/feed-in-tariff-statistics

Renewable Transport Fuel Obligation (RTFO)

6.64 The Renewable Transport Fuel Obligation, introduced in April 2008, placed a legal requirement on road transport fuel suppliers (who supply more than 450,000 litres of fossil petrol, diesel or renewable fuel per annum to the UK market) to ensure that 4.75 per cent (by volume) of their overall fuel sales are from a renewable source by 2013/14, with incremental levels of 2.5 per cent (by volume) for 2008/09, 3.25 per cent (by volume) in 2009/10, 3.5 per cent (by volume) in 2010/11, 4.0 per cent (by volume) in 2011/12, and 4.5 per cent (by volume) in 2012/13. Under the RTFO all obligated companies are required to submit data to the RTFO administrator on volumes of fossil and renewable fuels they supply. There is a monthly reporting process required of fuel companies under the RTFO, issuing Renewable Transport Fuel certificates in proportion to the quantity of biofuels registered.

6.65 The RTFO (amendment) Order, made in 2011, introduced mandatory carbon and sustainability criteria for all renewable fuels and double rewards for some fuel types, including those made from waste materials. From April 2013 the end uses covered by the RTFO have been amended to include non-road mobile machinery, agriculture and forestry tractors and recreational craft when not at sea. In order to keep the supply of biofuel broadly consistent the biofuel target for 2013/14 was changed from 5 per cent to 4.75 per cent based on data supplied by industry on the volume of fuel used for Non-Road Mobile Machinery (NRMM) end uses. Once the data on volumes of fuels supplied and sustainability criteria have been checked by the RTFO administrator and independently verified Renewable Transport Fuel Certificates are issued depending on the quantity and type of renewable fuel registered. Further information on the RTFO policy can be found at: www.gov.uk/government/publications/rtfo-guidance

6.66 The verified RTFO biofuels statistics, including information on origin and sustainability for obligation year 2012/13 were published by DfT on 6 February 2014. These, together with provisional data covering 2013/14, can be found at: www.gov.uk/government/collections/biofuels-statistics

Renewable Heat Incentive and Premium Payment

6.67 The Renewable Heat Incentive (RHI) scheme is a government financial incentive scheme introduced to encourage a switch to renewable heating systems in place of fossil fuels. The tariff based scheme is split into two parts:

- The non-domestic RHI scheme which has been open to commercial, industrial, public sector, not for profit and community generators of renewable heat since November 2011.
- The domestic RHI scheme which opened on 9 April 2014 and is available to homeowners, private and social landlords and people who build their own homes.

Further information on this scheme, including details of the technologies, can be found at: www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/renewable-heat-incentive-rhi.

6.68 The Renewable Heat Premium Payment (RHPP) voucher scheme, launched in August 2011, made one-off payments to householders to help them buy renewable heating technologies. This scheme closed on the 31 March 2014 prior to the introduction of the domestic RHI scheme. Further information on the RHPP can be found at: www.gov.uk/renewable-heat-premium-payment-scheme.

Data and statistical reports relating to both the RHI and RHPP can be found at: www.gov.uk/government/organisations/department-of-energy-climate-change/series/renewable-heat-incentive-renewable-heat-premium-payment-statistics.

Table 6D below shows the breakdown of installations and capacity by technology for the RHPP.

Table 6D: Renewable Heat Premium Payment voucher redemptions, capacity installed and estimated heat generation

Technology	Number of vouchers redeemed	Total capacity (MW) / Solar thermal estimated heat generation (MWh)
Ground or Water Source Heat Pump	2,274	26.1 MW
Biomass Boiler	2,451	56.2 MW
Air Source Heat Pump	6,003	68.4 MW
Solar Thermal	4,858	8,620 MWh
Total	**15,586**	

Sources of Renewable Energy

Use of passive solar energy

6.69 Nearly all buildings make use of some existing (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 technology is defined. The unplanned benefit of solar energy for heating and lighting in UK buildings is estimated to be 145 TWh per 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 per year.

Active solar heating

6.70 Active solar heating employs solar collectors to heat water mainly for domestic hot water systems but also for swimming pools and other applications. DECC intends to examine the case for active solar heating and other renewable heat solutions during the next scheduled review for the non-domestic RHI, due to start in 2014. Updated figures on the contribution of active solar heating have been obtained by Ricardo-AEA (on behalf of DECC) based on the Solar Trade Association sales figures. This year has also seen a change in methodology, as recommended by the IEA Solar heat and cooling program and ESTIF (European Solar Thermal Industry Foundation). For 2013, an estimated 257 GWh for domestic hot water generation replaces gas and electricity heating; for swimming pools, an estimated 1,407 GWh generation replaces gas (45 per cent), oil (45 per cent) or electricity (10 per cent). Details of the new methodology can be found at: www.estif.org/area_to_energy_conversion_method/

Solar photovoltaics (PV)

6.71 Photovoltaics 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. Support for small scale (less than 5 MW) solar PV and other micro-generation technologies in Great Britain has, since April 2010, been provided by FiTs (see paragraph 6.61), resulting in a rapid expansion in solar PV capacity. Larger-scale (> 50 kW) solar PV, as well as all Northern Irish installations, are supported by the

Renewables Obligation (RO) (see paragraph 6.56)[6]. The level of support for solar PV within the Renewable Obligation from April 2013 forms part of the banding review. Whilst generation data are available for sites accredited under the RO (via ROCs issued), it is not currently available for other schemes, including those supported by FiTs, so this has to be estimated. The methodology used for estimating generation from schemes supported by FiTs can be found at: www.gov.uk/government/publications/energy-trends-december-2013-special-feature-article-estimating-generation-from-feed-in-tariff-installations

Onshore wind power

6.72 Onshore wind is one of the most mature renewable energy technologies. The UK has an excellent onshore wind resource with wind speeds particularly good in Scotland, Northern Ireland and Wales, (less so in England, particularly the South East). A wind turbine extracts energy from the wind by means of a rotor (usually a three-bladed horizontal-axis rotor) that can be pitched to control the rotational speed of a shaft linked via a gearbox to a generator.

6.73 Following the introduction of the Renewables Obligation (RO) in April 2002 the rate of installation of new wind farms has increased year on year. Turbine size has steadily increased over the years and the average new turbine size for operational schemes over the last 5 years is around 2.5 MW. For those schemes under construction, however, this is moving towards 3 MW. The increased tower height associated with the increased turbine size has increased wind capture (wind speed generally increases with height above ground level) and turbine design has improved and become more sophisticated – both of these leading to improvements in efficiency over the early models, prompting some of the early projects which were installed around 20 years ago, to re-power (replacing ageing turbines with more efficient ones). 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 6.24 to 6.29 regarding load factors) and the wind farm installed capacity.

6.74 In the small-medium wind market (15–100 kW), generated energy is predominantly used to satisfy on-site demand. Small wind system technology can be subdivided into three categories: micro wind turbines (0–1.5 kW), small wind turbines (1.5–15 kW) and small–medium wind turbines (15–100 kW). The two main designs are the horizontal axis wind turbines (HAWT) and vertical axis wind turbines (VAWT).

6.75 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. With the arrival of FiTs it is anticipated that the main growth market will be for those applications connecting to the grid, with free-standing turbines continuing to make up the greatest share of installations.

Offshore wind power

6.76 The UK has some of the best wind resource in Europe, with relatively shallow waters and strong winds. The Renewable Energy Roadmap – referred to in paragraph 6.55 – highlights offshore wind as a key technology that will help the UK meet the 2020 RED target, with a central range of up to 18 GW for deployment by 2020 subject to cost reduction. This would correspond to around 17 per cent of the UK's net electricity production.

6.77 Offshore winds tend to blow at higher speeds and are more consistent than on land, thus allowing turbines to produce more electricity (because the potential energy produced from the wind is directly proportional to the cube of the wind speed, increased wind speeds of only a few miles per hour can produce a significantly larger amount of electricity). As a result, offshore turbines are generally larger than their onshore counterparts with the current commercially available turbines having a rated capacity of between 3 MW and 5 MW, although a number of larger, offshore specific, turbines are currently being developed. Floating concepts are also being developed as they are considered by many to be more viable (both economically and environmentally) in deeper waters. In addition,

[6] Eligible GB schemes between 50 kW and 5 MW capacity can currently choose between the RO and FiTs.

onshore constraints such as planning, noise effects and visual impact and transportation of large components are reduced offshore.

6.78 In the development of the UK's offshore wind capacity, the Crown Estate have run a number of leasing rounds under which areas of the seabed have been made available for the development of offshore wind farms. Round 1 started in December 2000 and Round 2 in July 2003. In January 2010, the Crown Estate announced the successful development partners for each of the nine new Round 3 offshore wind zones, potentially totalling up to 33 GW in capacity. The Round 3 zones were identified through a combination of consultation with key national stakeholders and the Crown Estate's marine asset planning expertise. The Round 3 capacity is in addition to the 8 GW already enabled across Rounds 1 and 2, with construction expected to begin in the middle of this decade. The combined total of all leasing rounds is over 49 GW (including sites in Scottish Territorial Waters and Round 1 and 2 extensions).

Marine energy (wave and tidal stream power)

6.79 Ocean waves are created by the interaction of winds with the surface of the sea. Because of the UK's position on the north eastern rim of the Atlantic it has some of the highest wave power levels in the world. Tidal currents are created by the movement of the tides, often magnified by local topographical features such as headlands, and channels. Tidal current energy is the extraction of energy from this flow, analogous to the extraction of energy from moving air by wind turbines. The UK is currently seen as the world leader in wave and tidal stream technology. Many of the leading device concepts were developed in the UK, including the Pelamis P2, the Aquamarine Oyster, Siemens SeaGen tidal turbine and several others

6.80 In April 2012, DECC launched the Marine Energy Array Demonstrator scheme (MEAD), to support the development and testing of pre-commercial marine devices in array formations out at sea. Two companies won funding under this: MeyGen Ltd, in the Pentland Firth in Inner Sound, Scotland; and SeaGeneration (Wales) Ltd, in Anglesey, Wales. Both are expected to up and running by the end of March 2016.

6.81 Tidal range power can be extracted from tidal barrage and tidal lagoon systems. With a tidal barrage across an estuary, water is collected during the flood tide, creating a head of water. During the ebb tide the water flows out of the pool through low-head hydro turbines thus generating electricity. Some technologies also allow generation on ebb and flood. A tidal lagoon works in a similar manner, but an artificial pool is used to collect the water. A tidal barrage has been in operation at La Rance on the northern French coast for more than 40 years, and schemes have previously been proposed in the UK, notably in the Severn Estuary. Some estimates suggest up to 5 per cent of the UK's current electricity demand could be met by a Severn Barrage. The environmental impacts and costs of such a scheme would however be considerable and the UK Government has decided not to pursue such a scheme through public funds.

Large scale hydro

6.82 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". The data in this Chapter exclude pumped storage stations (see paragraph 5.73). The UK has one mixed pump storage and natural flow hydro station, at Foyers in Scotland. Whilst it is primarily a pumped storage site, the generation attributed to the natural flow component of this station can be calculated, and is included in the large-scale hydro generation figures in this Chapter. However, the natural flow share of the capacity cannot be separated, and is therefore not included.

Small scale hydro

6.83 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. Currently there is 222 MW of installed small-scale hydro schemes. Of this, 61 per cent is owned by small-scale energy producers with the remainder owned by major power producers. There are 452 FITs and 263 non-FITs schemes in operation; 85 per cent of these non-FITs schemes claim ROCs, with 15 schemes having current NFFO contracts.

Deep geothermal energy

6.84 There are two broad types of deep geothermal technology – for direct heat use (where temperatures are above 60°C) and those for power generation (though normally as combined heat and power plants) usually where the resource temperature is above 120°C. The UK's deep geothermal resources include hot aquifers (i.e. subterranean bodies of water) in the North East, Wessex and Cheshire. The 'hot dry rocks' in Cornwall are likely to have the greatest potential (at 5km depth) for power generation. There are two simple models for deep geothermal projects. Where a hot aquifer has been identified, it is possible to simply pump the hot water to the surface and use it directly, for example in a heat network. The water then needs to be either disposed of or re-injected into the ground via a second borehole. An alternative model is to pump cold water from the surface down into a volume of hot rock, exploiting existing fractures in the rock or creating these through Enhanced Geothermal System techniques, and then recovering it to the surface once it has been heated.

6.85 Deep geothermal electricity generation is eligible for support under the Renewables Obligation. Deep geothermal energy for direct heat use is eligible for support under the Renewable Heat Incentive. The Government has also provided grant support for the sector. At present there are no deep geothermal power plants in the UK. The UK's only existing geothermal heat generating station is at Southampton, where an 1800m borehole taps into the edge of the aquifer under Wessex and provides heat to the Southampton district heat network, although this borehole is currently being refurbished.

6.86 Up to December 2013 geothermal was supported in the non-domestic RHI under the ground source heat pump tariff. Following the Government consultation on expanding the non-domestic RHI scheme, DECC confirmed that from December 2013 it would introduce a separate bespoke tariff for deep geothermal heat. The tariff is set at 5.0p/kWh, and deep geothermal heat is defined as coming from a drilling depth of a minimum of 500m.

Heat pumps

6.87 A ground source heat pump (GSHP) uses electricity to power a vapour compression cycle to pump heat from underground heat exchange coils and boreholes to a target heating system. An air source heat pump (ASHP) uses a vapour compression cycle to pump heat from ambient air to the target heating system. The ASHP data included in the Digest are air to water heat pumps extracting heat from external air only, and the renewable energy component of exhaust air systems. Information on GSHP and ASHP installations in the UK has been obtained from an annual market survey conducted by the research organisation BSRIA.

6.88 Ground source heat pumps are currently supported in heating mode in the non-domestic RHI. A two tier tariff system was introduced in January 2013 with a tier 1 tariff of 8.7p/kWh (for the first 1314 hours of operation) and a tier 2 tariff of 2.6p/kWh (for additional hours of operation). Air to water heat pumps utilising ambient air source have been supported under the non-domestic RHI since December 2013. The tariff available is 2.5p/kWh for all sizes of air source heat pump. Heat pumps utilising exhaust/ waste heat are excluded. Reversible and heat only air to air source heat pumps are not currently supported. The domestic RHI scheme was launched in April 2014, and so was not available for calendar year 2013. However, from April 2014 both ASHP and GSHP will be eligible for the domestic RHI and can claim tariffs of 7.3p/kWh and 18.8p/kWh renewable energy generated respectively, provided they meet the eligibility criteria.

6.89 Heat pumps use electricity to operate the compression cycle. The ratio of the heating output of a heat pump over the amount of electricity it uses gives the coefficient of performance (COP) of the heat pump. The seasonal performance factor (SPF), is the average COP for a heat pump over a whole year and reflects the efficiency a heat pump achieves when installed. The Renewable Energy Directive (Annex VII) sets out the equation for calculating how much of the energy generated by heat pumps should be considered renewable and a minimum SPF is part of that equation. The SPF is dependent on pan-EU average electricity generation efficiency. Heat pumps which do not meet the

minimum SPF are not counted as renewable under the Directive. The latest available guidance from the European Commission gives a minimum SPF of 2.5. For the purposes of statistics, it is assumed that the heat pumps installed in 2008 and later in the UK have an SPF which meets this minimum standard.

6.90 Since December 2013 all new heat pumps must meet a minimum COP of 2.9, and a minimum design SPF of 2.5 to be able to claim the non-domestic RHI. Data must be collected to enable calculation of the SPF in situ. This requires mandatory electricity consumption measurement and reporting in addition to metering of the heat produced for all heat pumps.

6.91 The contribution of energy from heat pumps is included in the Digest for 2008 onwards, in tables 6.1-6.3 and 6.6. For example, the output (less the electricity used to run the pump) is included in the production line in table 6.1, with the amount of this consumed by sector detailed within the final consumption sector below. The calculations have used information from BSRIA, a research organisation, that heat pumps installed in 2008 and onwards have a seasonal performance factor (SPF) that meets the minimum requirements set out in the Renewable Energy Directive (RED); it is assumed that there was no significant contribution from heat pumps installed before 2008.

6.92 Guidance on measuring the contribution of heat pumps for the RED was produced by the European Commission in March 2013, and data in this edition of the Digest has been revised to use this methodology. In summary, default values for SPF and hours of operation have been applied to information on the installed heat pump capacity. The UK is split into two climate zones which use different default values. The “cold” climate zone covers the North East, North West, Yorkshire and the Humber, and Scotland, with the “average” climate zone covering the remaining regions. Data from the RHPP scheme were used as a basis for allocating heat pumps to the climate zones.

Bioenergy and wastes

(a) Landfill gas

6.93 Landfill gas is a methane-rich gas formed from the natural decomposition of organic material in landfill sites. 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 benefited considerably from NFFO and resulted in a large rise in electricity generation from 1992. Information on generation comes from Renewables Obligation Certificates (ROCs), supplemented by a RESTATS survey carried out by Ricardo-AEA in 2008 on behalf of DECC.

(b) Sewage sludge digestion

6.94 Sewage sludge digestion is the break down of the solid part of sewage by natural bacteria in a sealed tank in the absence of oxygen to produce a methane rich sewage gas. Some plants only use the sewage gas to generate heat but many use combined heat and power (CHP) systems, with the electricity generated being used on site or sold under the NFFO. Information on the projects was provided from the CHAPSTATS Database, which is compiled and maintained by Ricardo-AEA on behalf of DECC (see Chapter 7). The majority of the information in the database is gathered through the CHP Quality Assurance (CHPQA) Programme. However, many sewage treatment works are not part of the CHPQA Programme and information on these plants comes from ROCs data. 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 89 per cent of the schemes (98 per cent of the capacity) were from RESTATS (i.e. ROCs) with the remainder from CHPQA; all schemes, however, were vetted by CHPQA before being accepted by RESTATS.

(c) Domestic wood combustion

6.95 Domestic wood use includes the use of logs in open fires, “AGA”-type cooker boilers and other wood burning stoves. Statistics on domestic wood use is one of a few cases where good data are not available and detailed surveys to improve this have been unsuccessful to date. Domestic wood use was for a long time estimated based on the historic survey results of 1989. Although there were two subsequent survey attempts (the final one in 2002) to improve these data, in both cases the results were not statistically sound to warrant changes to the current approach. The domestic wood use figure of 204 ktoe had therefore remained unchanged up to 2002 since it was originally surveyed in 1989.

6.96 During the survey of 2003, Ricardo-AEA were asked to examine an accumulating body of anecdotal evidence that implied that there was considerable growth in this area, suggesting that the use of this resource might start to be underestimated. This was based on the amount that was being burnt on open fires rather than dedicated wood-burning stoves, which has previously been overlooked. A revision in 2003 to subsequent domestic wood use figures was based on a 50 per cent growth rate in sales/installations over a 2-3 year period supported with anecdotal information from the sources listed below:

- HETAS, the official body recognised by Government to approve solid fuel domestic heating appliances, fuels and services;
- the National Association of Chimney Sweeps; and
- Discussions with a risk assessor acting on behalf of insurance companies.

6.97 Estimates from 2003 onwards are now made from annual discussions with representatives of these associations, using 2002 baseline data that are extrapolated forward, that are independently peer reviewed by the Forestry Commission prior to publication. This year has also seen the introduction of degree-day corrections based on that used for seasonally adjusted and temperature corrected final energy consumption figures for gas to model increased fuel use during colder weather[7]. These degree-day normalisation factors are based on monthly correction data and are weighted differently to those calculated using annual degree days. A degree day change in summer is unlikely to result in increased use of fuel for heating whereas it is during the colder months (behavioural issue). The accuracy of these estimates is, however, dependent on the accuracy of the base level figures for domestic wood use in 2002.

(d) Non-domestic wood combustion

6.98 In 1997, the industrial wood figure (which includes sawmill residues, furniture manufacturing waste etc.) was included as a separate category for the first time. Surveys in 2000 and 2006 highlighted that the in-house use of wood wastes had declined due to the imposition of more stringent emissions controls. Since these surveys, there has been increased interest in the use of wood, usually from forestry and woodland management but also in-house and recycled by-products. Typically these are being used for space heating and hot water in commercial and public sector properties such as hotels, schools, hospitals, nursing homes, poultry farms, horticulture and government buildings. This has been almost exclusively in response to incentives, most notably the Renewable Heat Incentive which has supported some 627 GWh of heat from biomass, mostly wood, to December 2013 since its inception in November 2011. This is equivalent to some 148 thousand tonnes of commercial wood pellets.

(e) Energy crops and forestry residues

6.99 Miscanthus and Short Rotation Coppice (SRC) are grown in the UK as energy crops intended for the heat and electricity energy markets. To date they have been burnt in power stations, CHP units and heating systems. Official area estimates of Miscanthus and SRC grown in England are available from 2008 in the Defra June survey of Agricultural statistics, and have been summarised by Defra[8] These show that only small areas of these crops are currently planted in England, with estimates of about 7,100ha of Miscanthus and 2,700ha of SRC in 2013. Based on Renewables Obligation sustainability reporting data, Defra estimate that about 45,000 tonnes of UK Miscanthus and 9,000 tonnes of UK SRC was used in UK power stations in 2011/2012.

(f) Straw combustion

6.100 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.

[7] www.gov.uk/government/uploads/system/uploads/attachment_data/file/295406/et1_3.xls
[8] Area of crops grown for bioenergy in England and the UK:2008-2012. Defra experimental statistics, 19 December 2013.

(g) Waste combustion

6.101 Domestic, industrial and commercial wastes represent a significant resource for materials and energy recovery. Unprocessed wastes may be combusted in purpose built incinerators or the waste can be processed into a range of refuse derived fuels (RDF) for both on-site and off-site use. RDF 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. Only the 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.

6.102 **Municipal solid waste (MSW) combustion:** MSW comprises domestic waste plus other feedstocks, such as, general industrial waste, building demolition waste and tree clippings from civil amenities. Sample areas for the analysis of household collected waste are selected using ACORN socio-economic profiles (ACORN stands for A Classification Of Residential Neighbourhoods). This 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. For several years, the analysis calculated that UK domestic waste had a biodegradable content of 67.5 per cent $\pm$ 1 per cent and this accounted for about 62.5 per cent of the energy generated from its combustion but work in 2009 revised this upwards to 63.5 per cent. The same figures has been used for this years' survey but will be reviewed on an annual basis. Information on the direct combustion of unprocessed MSW and the combustion of RDF was provided via a RESTATS questionnaire.

6.103 **General industrial waste (GIW) combustion:** 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. A survey conducted in 2001 noted that GIW was 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.

6.104 In 2013, 32 energy from waste plants were in operation, burning municipal solid waste (MSW), refuse derived fuel (RDF) and general industrial waste (GIW).

6.105 **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.

6.106 **Specialist non-biodegradable waste**. 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.

6.107 **Hospital waste**. Information is based on a RESTATS survey undertaken in 2007, repeated in 2010 and reviewed again in 2013. Additional information on sites that reclaim energy was obtained from the Environment Agency's clinical waste incineration database. Sites were contacted to confirm their operational status and verify the electrical installed capacity and generation. The results continue to show an ongoing process of centralisation and consolidation, in response to changes in pollution emissions and clinical waste regulations. Generation is focusing on larger plants and many smaller facilities have closed as they were no longer viable due to the cost of compliance with regulations.

6.108 **Animal biomass**. 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 a 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.

(h) Anaerobic digestion (AD)

6.109 Anaerobic Digestion uses natural bacteria to break down biomass in a sealed tank in the absence of oxygen to produce a methane rich biogas. The biomass fuel includes wet wastes such as animal manures and slurries, crop residues and food waste and/ or purpose grown crops such as maize. The biogas can be used for process heat, or for heat and electricity generation using a combined heat and power unit. Alternatively, the biogas can be upgraded to biomethane for use in transport applications or injection into the gas grid. The leftover indigestible material is called digestate; this is rich in nutrients and can be used as a fertiliser. Digestate can be used whole and spread on land. Alternatively, it can be separated into liquor and fibres. Separated fibre can be used fresh as a soil conditioner or, after further aerobic composting to stabilise it, the material is suitable for making into a compost product.

6.110 Information on operational AD sites in the UK was obtained from a number of sources including; the CHPQA database, information from previous AD surveys conducted for RESTATS, the AD portal run by NNFCC, the REA, the Renewable Energy Planning Database, ROC, FiT and RHI returns and Ricardo-AEA internal information. Electricity and heat production was estimated using survey information, where available, or information from ROC, FiT and RHI if no survey information existed. Where neither of these sources was available the energy production was calculated from the capacity an estimated load factor. The load factor was based on ROC data from operating schemes and date of commissioning where applicable applicable for electricity schemes, and on historic load factors for heat only schemes. Of the 171 electricity-generating AD plants operating at the end of 2013, 59 (61 MW) qualified as CHP plant under CHAPSTATS. An additional 16 were heat only and two were producing bio-methane for grid injection. The majority of the heat-only schemes were small on-farm installations.

(i) Co-firing of biomass with fossil fuels

6.111 Compared with some other renewables, co-firing has a relatively low capital cost and is quick to implement. Biomass fuel is usually fed into a conventional power station boiler by means of the existing firing mechanism as a partial substitute for fossil fuel. The pulverised fuel preparation, transport and combustion system of a modern power plant may cope with approximately 5 - 10 per cent substitution without any major mechanical changes. The boiler design and airflows however may permit much higher percentages if the burner systems are modified. Specially designed burners have been introduced on some installations in the UK.

(j) Biodiesel and bioethanol (Liquid Biofuels for Transport)

6.112 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. Bioethanol is defined for taxation purposes as a liquid fuel consisting of ethanol produced from biomass and capable of being used for the same purposes as light oil. For further information, see HMRC Notice 179E: Biofuels and other fuel substitutes, October 2009, available at:
http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageVAT_ShowContent&id=HMCE_CL_000205&propertyType=document#P22_1468
Diesel fuel currently sold at retail outlets in the UK can contain up to 7 per cent biodiesel. Petrol currently sold in at retail outlets in the UK can contain up to 5% bioethanol. Since March 2013 a revised petrol standard (EN228) allows retailers to sell petrol containing up to 10% ethanol by volume (E10), if appropriately labelled[9].

Combined Heat and Power (CHP)

6.113 A CHP plant is an installation where useful heat and power (usually electricity) are supplied from a single generation process. Some CHP installations are fuelled either wholly or partially by renewable fuels. The main renewable fuel currently used in CHP is sewage gas, closely followed by other biomass.

6.114 Chapter 7 of this Digest summarises information on the contribution made by CHP to the United Kingdom's energy requirements in 2009 to 2013 using the results of annual studies undertaken to identify all CHP schemes (CHAPSTATS). Included in Tables 7.1 to 7.9 of that chapter is

[9] www.gov.uk/government/uploads/system/uploads/attachment_data/file/232126/petrol-protection-extention-ia.pdf

information on the contribution of renewable sources to CHP generation in each year from 2009 to 2013. Corresponding data for 1996 to 2008 are available on the DECC section of the gov.uk website. The information contained in those tables is therefore a subset of the data contained within the tables presented in this chapter. There are occasionally differences in the numbers reported by CHAPSTATS compared with RESTATS that are primarily attributed to whether the electricity is considered to come from 'good quality' CHP; further details on 'good quality' CHP are to be found in Chapter 7. In addition, there are oddities with some CHP facilities where biomass and fossil fuels are both burnt (though not always as co-firing). The total installed capacity recorded for the site under CHAPSTATS can cover multiple generators, some of which only handle fossil fuels (eg. gas turbines). As it would be misleading to record the entire capacity reported in RESTATS as being potentially available for renewables generation, only the appropriate capacity figures are recorded.

Generating capacity and load factor

6.115 The electrical capacities are given in Table 6.4 as installed capacities i.e. the maximum continuous rating of the generating sets in the stations. In Chapter 5 Declared Net Capacity (DNC) is used, i.e. 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, 0.33 for shoreline wave, and 0.17 for solar photovoltaics. 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 6.1.1 on the DECC section of the gov.uk website.

6.116 Plant load factors shown in Table 6.5 have been calculated in terms of installed capacity (i.e. 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. Additionally, the unchanged configuration load factor has now been used for a number of years, which calculates 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.

6.117 It is recognised that one of the shortcomings of the data contained in the Digest (end of calendar year) is that finalised ROCs data are often not available for several months following the compilation process for the Digest. In particular this can have an impact on the schemes included in the unchanged configuration definition as new data could include or remove particular schemes. This should be kept in mind if users wish to reanalyse these results.

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6.1 Commodity balances 2013

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 (4)	Sewage gas	Landfill gas
Supply						
Production	367	700	506	978	318	1,709
Other sources	-	-	-	-	-	-
Imports	32	5	-	1,540	-	-
Exports	-56	-104	-	-46	-	-
Marine bunkers	-	-	-	-	-	-
Stock change *(1)*	-	-	-	-	-	-
Transfers	-	-	-	-	-	-
Total supply (2)	**343**	**600**	**506**	**2,473**	**318**	**1,709**
Statistical difference *(3)*	-	-	-	-	-	-
Total demand	**343**	**600**	**506**	**2,473**	**318**	**1,709**
Transformation	**-**	**-**	**458**	**2,152**	**250**	**1,695**
Electricity generation	-	-	458	2,134	250	1,695
Major power producers	-	-	188	1,819	-	-
Autogenerators	-	-	270	315	250	1,695
Heat generation	-	-	-	18	-	-
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	**343**	**600**	**48**	**321**	**68**	**14**
Industry	**343**	**-**	**29**	**129**	**-**	**14**
Unclassified	343	-	29	129	-	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	**-**	**600**	**19**	**192**	**68**	**-**
Domestic	-	600	-	-	-	-
Public administration	-	-	-	-	68	-
Commercial	-	-	-	-	-	-
Agriculture	-	-	19	192	-	-
Miscellaneous	-	-	-	-	-	-
Non energy use	**-**	**-**	**-**	**-**	**-**	**-**

(1) Stock fall (+), stock rise (-).
(2) Including non-biodegradable wastes, which accounted for 626 ktoe.
(3) Total supply minus total demand.
(4) SRC is short rotation coppice.
(5) Municipal solid waste, general industrial waste and hospital waste.
(6) The amount of shoreline wave and tidal included is 0.5 ktoe.

6.1 Commodity balances 2013 (continued)

Renewables and waste

Thousand tonnes of oil equivalent

Waste *(5)* and tyres	Geothermal, active solar heat and PV	Heat pumps	Hydro	Wind wave and tidal *(6)*	Liquid biofuels	Total renewables	
							Supply
1,482	365	91	404	2,445	542	9,907	Production
-	-	-	-	-	-	-	Other sources
-	-	-	-	-	590	2,167	Imports
-	-	-	-	-	-41	-247	Exports
-	-	-	-	-	-	-	Marine bunkers
-	-	-	-	-	-	-	Stock change *(1)*
-	-	-	-	-	-	-	Transfers
1,482	**365**	**91**	**404**	**2,445**	**1,091**	**11,827**	**Total supply** *(2)*
-	-	-	-	-	-	-	**Statistical difference** *(3)*
1,482	**365**	**91**	**404**	**2,445**	**1,091**	**11,827**	**Total demand**
1,380	**175**	**-**	**404**	**2,445**	**-**	**8,959**	**Transformation**
1,297	175	-	404	2,445	-	8,858	Electricity generation
401	-	-	310	2,049	-	4,767	Major power producers
896	175	-	94	396	-	4,091	Autogenerators
83	-	-	-	-	-	101	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**
103	**190**	**91**	**-**	**-**	**1,091**	**2,868**	**Final consumption**
35	**-**	**1**	**-**	**-**	**-**	**550**	**Industry**
35	-	1	-	-	-	550	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
-	-	-	-	-	**1,091**	**1,091**	**Transport**
-	-	-	-	-	-	-	Air
-	-	-	-	-	-	-	Rail
-	-	-	-	-	1,091	1,091	Road
-	-	-	-	-	-	-	National navigation
-	-	-	-	-	-	-	Pipelines
67	**190**	**90**	**-**	**-**	**-**	**1,227**	**Other**
22	190	72	-	-	-	884	Domestic
29	0	-	-	-	-	98	Public administration
16	0	18	-	-	-	34	Commercial
-	-	-	-	-	-	211	Agriculture
-	-	-	-	-	-	-	Miscellaneous
-	**-**	**-**	**-**	**-**	**-**	-	**Non energy use**

6.2 Commodity balances 2012

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 (4)	Sewage gas	Landfill gas
Supply						
Production	389r	624r	435r	744r	300r	1,704
Other sources	-	-	-	-	-	-
Imports	32	3	-	1,016	-	-
Exports	-131	-119	-	-22	-	-
Marine bunkers	-	-	-	-	-	-
Stock change *(1)*	-	-	-	-	-	-
Transfers	-	-	-	-	-	-
Total supply (2)	289r	**508r**	**435r**	**1,738r**	**300r**	**1,704**
Statistical difference *(3)*	-	-	-	-	-	-
Total demand	289r	**508r**	**435r**	**1,738r**	**300r**	**1,704**
Transformation	27r	**-**	**389r**	**1,498r**	**236r**	**1,690**
Electricity generation	-	-	389r	1,463r	236r	1,690
Major power producers	-	-	188	1,177	-	-
Autogenerators	-	-	201r	286r	236r	1,690
Heat generation	27r	-	-	35r	-	-
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	263r	**508r**	**46r**	**240r**	**64r**	**14**
Industry	263r	**-**	**32**	**97**	**-**	**14**
Unclassified	263r	-	32	97	-	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	**-**	**508r**	**15r**	**142r**	**64r**	**-**
Domestic	-	508r	-	-	-	-
Public administration	-	-	-	-	64r	-
Commercial	-	-	-	-	-	-
Agriculture	-	-	15r	142r	-	-
Miscellaneous	-	-	-	-	-	-
Non energy use	**-**	**-**	**-**	**-**	**-**	**-**

(1) Stock fall (+), stock rise (-).
(2) Including non-biodegradable wastes, which accounted for 628 ktoe.
(3) Total supply minus total demand.
(4) SRC is short rotation coppice.
(5) Municipal solid waste, general industrial waste and hospital waste.
(6) The amount of shoreline wave and tidal included is 0.3 ktoe.

6.2 Commodity balances 2012 (continued)

Renewables and waste

Thousand tonnes of oil equivalent

Waste *(5)* and tyres	Geothermal, active solar heat and PV	Heat pumps	Hydro	Wind wave and tidal *(6)*	Liquid biofuels	Total renewables	
							Supply
1,501r	269r	68r	454	1,691r	317	8,496r	Production
-	-	-	-	-	-	-	Other sources
-	-	-	-	-	674	1,725	Imports
-	-	-	-	-	-33	-306	Exports
-	-	-	-	-	-	-	Marine bunkers
-	-	-	-	-	-	-	Stock change *(1)*
-	-	-	-	-	-	-	Transfers
1,501r	**269r**	**68r**	**454**	**1,691r**	**958**	**9,915r**	**Total supply** *(2)*
-	-	-	-	-	-	-	**Statistical difference** *(3)*
1,501r	**269r**	**68r**	**454**	**1,691r**	**958**	**9,915r**	**Total demand**
1,390r	**116r**	**-**	**454**	**1,691r**	**-**	**7,491r**	**Transformation**
1,327r	116r	-	454	1,691r	-	7,366r	Electricity generation
401	-	-	359	1,459r	-	3,583r	Major power producers
926r	116r	-	96	232	-	3,783r	Autogenerators
63r	-	-	-	-	-	125r	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**
111r	**153r**	**68r**	**-**	**-**	**958**	**2,424r**	**Final consumption**
52	**-**	**1**	**-**	**-**	**-**	**458r**	**Industry**
52	-	1	-	-	-	458r	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
-	-	-	-	-	**958**	**958**	**Transport**
-	-	-	-	-	-	-	Air
-	-	-	-	-	-	-	Rail
-	-	-	-	-	958	958	Road
-	-	-	-	-	-	-	National navigation
-	-	-	-	-	-	-	Pipelines
59r	**153r**	**68r**	**-**	**-**	**-**	**1,008r**	**Other**
18r	152r	54r	-	-	-	732r	Domestic
24r	0	-	-	-	-	89r	Public administration
16	0	14r	-	-	-	30r	Commercial
-	-	-	-	-	-	157r	Agriculture
-	-	-	-	-	-	-	Miscellaneous
-	**-**	**-**	**-**	**-**	**-**	**-**	**Non energy use**

6.3 Commodity balances 2011

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 (4)	Sewage gas	Landfill gas
Supply						
Production	383	434r	359r	747r	315r	1,684
Other sources	-	-	-	-	-	-
Imports	29	3	-	876	-	-
Exports	-131	-35	-	-17	-	-
Marine bunkers	-	-	-	-	-	-
Stock change *(1)*	-	-	-	-	-	-
Transfers	-	-	-	-	-	-
Total supply (2)	**282**	**402r**	**359r**	**1,606r**	**315r**	**1,684**
Statistical difference *(3)*	-	-	-	-	-	-
Total demand	**282**	**402r**	**359r**	**1,606r**	**315r**	**1,684**
Transformation	**11**	**-**	**313r**	**1,352r**	**250**	**1,670**
Electricity generation	-	-	313r	1,317r	250	1,670
Major power producers	-	-	192	961	-	-
Autogenerators	-	-	121r	357r	250	1,670
Heat generation	11	-	-	35	-	-
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	**271**	**402r**	**45r**	**254**	**64r**	**14**
Industry	**271**	**-**	**36**	**107**	**-**	**14**
Unclassified	271	-	36	107	-	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	**-**	**402r**	**10**	**147**	**64r**	**-**
Domestic	-	402r	-	-	-	-
Public administration	-	-	-	-	64r	-
Commercial	-	-	-	-	-	-
Agriculture	-	-	10	147	-	-
Miscellaneous	-	-	-	-	-	-
Non energy use	**-**	**-**	**-**	**-**	**-**	**-**

(1) Stock fall (+), stock rise (-).
(2) Including non-biodegradable wastes, which accounted for 545 ktoe.
(3) Total supply minus total demand.
(4) SRC is short rotation coppice.
(5) Municipal solid waste, general industrial waste and hospital waste.
(6) The amount of shoreline wave and tidal included is less than 0.1 ktoe.

6.3 Commodity balances 2011 (continued)

Renewables and waste

Thousand tonnes of oil equivalent

Waste *(5)* and tyres	Geothermal, active solar heat and PV	Heat pumps	Hydro	Wind wave and tidal *(6)*	Liquid biofuels	Total renewables	
							Supply
1,259r	144	47r	489	1,330r	182	7,374r	Production
-	-	-	-	-	-	-	Other sources
-	-	-	-	-	947	1,854	Imports
-	-	-	-	-	-1	-184	Exports
-	-	-	-	-	-	-	Marine bunkers
-	-	-	-	-	-	-	Stock change *(1)*
-	-	-	-	-	-	-	Transfers
1,259r	**144**	**47r**	**489**	**1,330r**	**1,128**	**9,044r**	**Total supply** *(2)*
-	-	-	-	-	-	-	**Statistical difference** *(3)*
1,259r	**144**	**47r**	**489**	**1,330r**	**1,128**	**9,044r**	**Total demand**
1,125r	**21**	**-**	**489**	**1,330r**	**-**	**6,562r**	**Transformation**
1,074r	21	-	489	1,330r	-	6,465r	Electricity generation
110	-	-	395	1,090	-	2,747	Major power producers
964r	21	-	94	241r	-	3,717r	Autogenerators
51	-	-	-	-	-	97	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**
134r	**123**	**47r**	**-**	**-**	**1,128**	**2,482r**	**Final consumption**
77	**-**	**0**	**-**	**-**	**-**	**505**	**Industry**
77	-	0	-	-	-	505	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
-	-	-	-	-	**1,128**	**1,128**	**Transport**
-	-	-	-	-	-	-	Air
-	-	-	-	-	-	-	Rail
-	-	-	-	-	1,128	1,128	Road
-	-	-	-	-	-	-	National navigation
-	-	-	-	-	-	-	Pipelines
57r	**123**	**46r**	**-**	**-**	**-**	**849r**	**Other**
18r	122	37r	-	-	-	580r	Domestic
29	0	-	-	-	-	94r	Public administration
9	0	9r	-	-	-	19r	Commercial
-	-	-	-	-	-	156	Agriculture
-	-	-	-	-	-	-	Miscellaneous
-	**-**	**-**	**-**	**-**	**-**	-	**Non energy use**

6.4 Capacity of, and electricity generated from, renewable sources

	2009	2010	2011	2012	2013
Installed Capacity (MW) *(1)*					
Wind:					
Onshore	3,468r	4,055r	4,620r	5,899r	7,513
Offshore	951	1,341	1,838	2,995	3,696
Marine energy (wave and tidal stream)	2	3	3	7	7
Solar photovoltaics	27	94r	994r	1,747r	2,780
Hydro:					
Small scale	176r	184r	202r	216r	222
Large scale *(2)*	1,459	1,453	1,471	1,471	1,471
Bioenergy:					
Landfill gas	968	1,008	1,050	1,036	1,042
Sewage sludge digestion	157r	193r	198r	204r	198
Energy from waste *(3)*	384	428	504r	521r	553
Animal Biomass (non-AD)*(4)*	111	111	111	111	111
Anaerobic digestion	12r	30r	70r	118r	150
Plant Biomass *(5)*	284	315r	1,149r	1,166r	1,949
Total bioenergy and wastes	1,916r	2,084r	3,082r	3,156r	4,002
Total	7,999r	9,215r	12,210r	15,491r	19,690
Co-firing (6)	208	266	338	204	35
Generation (GWh)					
Wind:					
Onshore *(7)*	7,529r	7,136r	10,347r	12,112r	16,992
Offshore	1,754	3,044	5,126	7,549r	11,441
Marine energy (wave and tidal stream) *(8)*	1	2	1	4	6
Solar photovoltaics	20r	40r	244r	1,351r	2,036
Hydro:					
Small scale *(7)*	567r	476r	693r	653r	672
Large scale *(2)*	4,664r	3,092	4,989	4,631	4,026
Bioenergy:					
Landfill gas	4,929	5,037	5,092	5,154	5,169
Sewage sludge digestion	603r	697r	764r	719r	761
Biodegradable energy from waste *(9)*	1,509	1,597	1,643r	2,034r	1,987
Co-firing with fossil fuels	1,625	2,332	2,964	1,783	309
Animal Biomass *(4)*	637	627	615	643	628
Anaerobic digestion	43	111r	272r	499r	707
Plant Biomass *(5)*	1,327	1,594r	1,749r	4,083r	8,933
Total bioenergy	10,674r	11,996r	13,098r	14,914r	18,494
Total generation	25,208r	25,785r	34,498r	41,214r	53,667
Non-biodegradable wastes *(10)*	868	919	945r	1,170r	1,143
Total generation from sources eligible for the Renewable Obligation *(11)*	21,051r	21,947r	29,034r	33,428r	43,359

(1) Capacity on a DNC basis is shown in Long Term Trends Table 6.1.1 available on the DECC web site - see paragraph 6.5.
(2) Excluding pumped storage stations. Capacities are as at the end of December.
(3) Includes waste tyres and hospital waste.
(4) Includes the use of poultry litter and meat & bone.
(5) Includes the use of straw combustion and short rotation coppice energy crops.
(6) This is the proportion 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) Includes electricity from the EMEC test facility.
(9) Biodegradable part only.
(10) Non-biodegradable part of municipal solid waste plus waste tyres, hosptal waste and general industrial waste.
(11) See paragraphs 6.56 to 6.58 for definition and coverage.

6.5 Load factors for renewable electricity generation

Per cent

	2009	2010	2011	2012	2013
Load factors - based on average beginning and end of year capacity (1)					
Wind	26.9r	23.7r	29.8r	29.2r	32.3
Onshore wind	27.2r	21.7r	27.2r	26.2r	28.9
Offshore wind	25.9r	30.3	36.8	35.6r	38.9
Marine energy (wave and tidal stream)	4.8	8.4	3.8	8.3	9.7
Solar photovoltaics	9.3r	7.6r	5.1r	11.2r	10.2
Hydro	36.7r	24.9r	39.2r	35.8r	31.7
Hydro (small scale)	37.8r	30.2r	41.0r	35.7r	35.1
Hydro (large scale)	36.5r	24.2	39.0	35.8	31.2
Bioenergy (excludes cofiring and non-biodegradable wastes)	56.5r	55.2r	44.8r	47.9r	58.0
Landfill gas	60.5	58.2	56.5	56.2	56.8
Sewage sludge digestion	44.5r	45.5r	44.6r	40.7r	43.2
Energy from waste (3)	45.8	44.9	40.3r	45.2r	42.3
Animal Biomass (4)	65.8	64.8	63.5	66.2	64.9
Anaerobic Digestion	51.7r	59.9r	61.6r	60.2r	60.2
Plant Biomass (5)	61.2	60.7r	27.3r	40.2r	65.5
All renewable technologies (excluding cofiring and non-biodegradable wastes)	36.3r	31.1r	33.6r	32.4r	34.6
Load factors - for schemes operating on an unchanged configuration basis (2)					
Wind	27.4r	23.3r	29.4r	28.0r	31.0
Onshore wind	26.5r	21.5r	27.2r	25.6r	27.9
Offshore wind	32.1	29.5	35.0r	33.7	37.5
Hydro	38.3r	26.5r	41.7	35.3	31.6
Hydro (small scale)	37.3r	29.9r	43.2	35.9	35.2
Hydro (large scale)	38.4r	26.2r	41.5	35.3	31.3
Bioenergy (excludes cofiring and non-biodegradable wastes)	61.8r	60.9r	61.1r	62.8r	60.0
Landfill gas	59.6r	57.7r	59.5	58.5r	57.3
Sewage sludge digestion	50.0r	53.1r	53.5r	48.0r	50.2
Energy from waste (3)	43.1r	42.9r	40.2r	44.5r	41.9
Animal Biomass (4)	65.8r	64.8r	69.0r	66.2	70.4
Anaerobic Digestion	46.9r	58.8r	57.6r	60.5r	60.7
Plant Biomass (5)	65.6r	66.6r	60.9	67.2r	62.3
All renewable technologies (excluding cofiring and non-biodegradable wastes)	37.7r	32.3r	37.2r	36.0r	35.6

(1) See paragraph 6.24 for details of the calculation.

(2) See paragraph 6.28 for details of the calculation.

(3) Calculation is based on biodegradable waste generation but all waste capacity; this reduces the load factor.

(4) Includes the use of poultry litter and meat & bone.

(5) Includes the use of straw combustion and short rotation coppice energy crops.

6.6 Renewable sources used to generate electricity and heat and for transport fuels*(1)(2)*

Thousand tonnes of oil equivalent

	2009	2010	2011	2012	2013
Used to generate electricity *(3)*					
Wind:					
Onshore	647.4r	613.6r	889.6r	1,041.4r	1,461.1
Offshore	150.8	261.7	440.7	649.1r	983.8
Marine energy (wave and tidal stream) (4)	0.1r	0.2r	0.1r	0.3r	0.5
Solar photovoltaics	1.7	3.5	21.0	116.1	175.0
Hydro:					
Small scale	48.7r	40.9r	59.6r	56.2r	57.8
Large scale *(5)*	401.0r	265.9	429.0	398.2	346.2
Bioenergy:					
Landfill gas	1,616.7	1,652.0	1,670.1	1,690.3	1,695.1
Sewage sludge digestion	197.9r	228.5r	250.4r	235.9r	249.6
Biodegradable energy from waste	624.5	659.0	677.8r	838.9r	819.8
Co-firing with fossil fuels	439.8r	625.2r	763.5r	400.5r	53.7
Animal Biomass *(6)*	232.0	238.9	224.0	225.0	226.4
Anaerobic digestion	14.3	36.4r	89.1r	163.6r	231.7
Plant Biomass *(7)*	386.7r	461.2r	553.7r	1,062.3r	2,079.9
Total bioenergy	3,511.9r	3,901.2r	4,228.7r	4,616.6r	5,356.3
Total	4,761.6r	5,086.8r	6,068.8r	6,878.0r	8,380.6
Non-biodegradable wastes *(8)*	365.2	385.1	395.9r	488.5r	477.5
Used to generate heat					
Active solar heating	77.0	97.5	122.4	152.3r	189.5
Bioenergy:					
Landfill gas	13.6	13.6	13.6	13.6	13.6
Sewage sludge digestion	50.9r	57.7r	64.3r	63.7r	68.3
Wood combustion - domestic	357.7r	458.5r	401.9r	507.7r	600.3
Wood combustion - industrial	223.4	255.7	281.9	289.5r	342.9
Animal Biomass *(9)*	38.3	40.3	35.8	31.5	29.1
Anaerobic digestion	2.0	4.8	9.7r	15.0r	18.7
Plant Biomass *(10)*	227.4	270.0	288.5	275.1	339.0
Biodegradable energy from waste *(6)*	31.6	29.0r	36.2r	34.1r	36.2
Total bioenergy	944.9r	1,129.6r	1,131.8r	1,230.2r	1,448.1
Deep geothermal	0.8	0.8	0.8	0.8	0.8
Heat Pumps	13.3r	28.0r	46.9r	68.2r	90.6
Total	1,036.1r	1,256.0r	1,301.9r	1,451.5r	1,729.1
Non-biodegradable wastes *(8)*	143.9	136.9r	149.6r	139.7r	148.8
Renewable sources used as transport fuels					
as Bioethanol	180.4	355.4	367.5	436.9	461.7
as Biodiesel	858.1	861.9	760.0	520.9	629.4
Total	1,038.5	1,217.3	1,127.5	957.8	1,091.0
Total use of renewable sources and wastes					
Solar heating and photovoltaics	78.7r	101.0r	143.4r	268.4r	364.6
Onshore wind	647.4r	613.6r	889.6r	1,041.4r	1,461.1
Offshore wind	150.8	261.7	440.7	649.1r	983.8
Marine energy (wave and tidal stream)	0.1	0.2	0.1	0.3	0.5
Hydro	449.8r	306.8r	488.6r	454.4r	404.0
Bioenergy	4,456.8r	5,030.8r	5,360.5r	5,846.8r	6,804.4
Deep geothermal	0.8	0.8	0.8	0.8	0.8
Heat Pumps	13.3r	28.0r	46.9r	68.2r	90.6
Transport biofuels	1,038.5	1,217.3	1,127.5	957.8	1,091.0
Total	6,836.2r	7,560.2r	8,498.3r	9,287.3r	11,200.7
Non-biodegradable wastes *(8)*	509.1	521.9r	545.5r	628.2r	626.3
All renewables and wastes *(11)*	7,345.4r	8,082.1r	9,043.7r	9,915.5r	11,827.0

(1) Includes some waste of fossil fuel origin.
(2) See the Digest of UK Energy Statistics 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 bioenergy the figures represent the energy content of the fuel used.
(4) Includes the EMEC test facility.
(5) Excluding pumped storage stations.
(6) Includes electricity from poultry litter combustion and meat & bone combustion.
(7) Includes electricity from straw and energy crops.
(8) Non-biodegradable part of municipal solid waste plus waste tyres, hospital waste, and general industrial waste.
(9) Includes heat from farm waste digestion, and meat and bone combustion.
(10) Includes heat from straw, energy crops, paper and packaging.
(11) The figures in this row correspond to the total demand and total supply figures in Tables 6.1, 6.2 and 6.3.

6.7 Renewable sources data used to indicate progress under the 2009 EU Renewable Energy Directive (measured using net calorific values)

Thousand tonnes of oil equivalent

	2009	2010	2011	2012	2013
Electricity generation component:					
Normalised hydro generation *(1) (2)*	430r	419r	439r	446r	440
Normalised wind generation *(3)*	804r	965r	1,209r	1,603r	2,208
Electricity generation from renewables other than wind, hydro, and compliant biofuels	920r	1,035r	1,147r	1,399r	1,766
Electricity generation from compliant biofuels	-	-	-	-	-
Total renewable generation from all compliant sources	2,153r	2,420r	2,795r	3,448r	4,414
Total Gross Electricity Consumption *(2)*	32,321r	32,779r	31,863r	32,013r	31,873
Percentage of electricity from renewable sources	6.7%	7.4%	8.8%	10.8%	13.9%
Heat component:					
Renewable energy for heating and cooling	953r	1,169r	1,220r	1,364r	1,643
Total Gross energy consumption for heating and cooling	57,380r	63,173r	53,096r	57,212r	58,918
Percentage of heating and cooling energy from renewable sources	1.7%	1.9%	2.3%	2.4%	2.8%
Transport component (excluding air transport):					
Road transport renewable electricity	0	0	0	0r	1
Non-road transport renewable electricity	55	58	66r	69r	76
Biofuels (restricted to those meeting sustainability criteria from 2011)	988	1,150	968	882r	1,014
Total electricity consumption in transport	347	350	351r	352r	353
Total petrol and diesel consumption in transport	38,105r	37,719r	37,234r	37,070r	36,791
Total transport component numerator (including weighted components) *(4)*	1,044	1,209	1,034r	1,405r	1,666
Total transport component denominator (including weighted components) (4)	39,441r	39,220r	38,649r	38,319r	38,168
Percentage of transport energy from renewable sources *(4)*	2.6%	3.1%	2.7%	3.7%	4.4%
Overall directive target:					
Renewables used for:					
Electricity generation	2,153r	2,420r	2,795r	3,448r	4,414
Heating and Cooling	953r	1,169r	1,220r	1,364r	1,643
Transport biofuels (restricted to those meeting sustainability criteria from 2011)	988	1,150	968	882r	1,014
Total Final Consumption of Renewable Energy ["Row A"]	4,095r	4,739r	4,983r	5,694r	7,072
Final Electricity Consumption *(5)*	27,664	28,273r	27,331r	27,327r	27,280
Transport Final Energy Consumption (including air transport) *(6)*	51,439r	50,768r	50,485r	49,746r	49,452
Heating and Cooling Final Energy Consumption	57,380r	63,173r	53,096r	57,212r	58,918
Total Final Energy Consumption *(7)*	136,483r	142,214r	130,912r	134,285r	135,650
plus Distribution losses for electricity	2,420r	2,283r	2,346r	2,407r	2,307
plus Distribution losses for heat	-	-	-	-	-
plus Consumption of electricity in the electricity and heat generation sectors	1,425r	1,385r	1,411r	1,543r	1,538
plus Consumption of heat in the electricity and heat generation sectors	-	-	-	-	-
Gross Final Energy Consumption (GFEC)	140,328r	145,881r	134,670r	138,234r	139,495
of which Air transport	12,114	11,673	12,162	11,788	11,645
Air transport as a proportion of GFEC	8.63%	8.00%	9.03%	8.53%	8.35%
Air transport cap specificed in Directive	6.18%	6.18%	6.18%	6.18%	6.18%
Capped air transport	8,672r	9,015r	8,323r	8,543r	8,621
Capped Gross Final Energy Consumption (CGFEC) ["Row B"] *(8)*	136,887r	143,223r	130,830r	134,990r	136,470
Headline Directive percentage : Renewable Energy Consumption as a percentage of Capped Gross Final Energy Consumption ["Row A" divided by "Row B"]	3.0%	3.3%	3.8%	4.2%	5.2%

(1) Based on a 15 year average hydro load factor.
(2) Excludes generation from pumped storage.
(3) Based on a 5 year average wind load factor.
(4) Some sustainable biofuels are double weighted in the numerator of this calculation, as specified by the Directive.
(5) Final Electricity Consumption is Gross Electricity Consumption minus generators' own use of electricity and losses.
(6) Includes consumption of petrol and diesel, biofuels, other oil products, and coal.
(7) Total final consumption less non-energy use, as shown in Annex I, Table I.1, available on the DECC website.
(8) This row includes adjustments for loses, and generators own use of electricity, combined with the capping mechanism for air transport as specified in the Directive.

Chapter 7
Combined heat and power

Key Points

- The Good Quality CHP capacity remained steady during 2013, reducing by 5 MWe from 6,175 MWe to 6,170 MWe (Table 7.1).
- The amount of good quality electricity produced fell by almost 9 per cent between 2012 and 2013, to 20.9 TWh in 2013. The good quality electricity generated by CHP in 2013 corresponds to about 5.8 per cent of all electricity produced in the UK (Table 7.4).
- Sixty-seven per cent of the fuel used in CHP schemes was natural gas. The use of renewable fuel has again increased and now stands at over 10.5 per cent of total Good Quality CHP fuel reported in this Chapter (Table 7.2).
- The Oil and Gas sector is the sector which has the largest Good Quality CHP capacity, followed by the Chemicals sector (Table 7.8).
- The CO_2 savings delivered by CHP in 2013 were lower than in 2012. This is due to lower CHP outputs in 2013 compared to 2012 and lower provisional values of CO2 intensity of electricity displaced by CHP generated electricity, from the higher 2012 values (Table 7H).

Introduction

7.1 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 CHPQA methodology in respect of data obtained from other sources. 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.

7.2 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 industrial processes, hot water and space heating or cooling.

7.3 CHP is typically sized to make use of the available heat[1], with the electricity produced 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, and lower heat losses. These gains are reflected in the calculation of CO_2 savings delivered by CHP (see 7.28-7.29). 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 7.36 later in this chapter.

[1] *But not always, see paragraph 7.6. In such cases there is an impact upon the electrical capacity and electrical output classified as CHP.*

7.4 Size ranges within the 2014 Digest have been changed to allow more effective monitoring of the effect of regulatory and tax regimes. For this reason, figures in Table 7B, "CHP schemes by capacity size ranges in 2013" and Table 7.1, "CHP installations by capacity and size range" are not directly comparable to previous Digests.

UK energy markets, and their effect on CHP

7.5 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 both for own use and export. 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). Energy price trends that are applicable to CHP schemes differ depending upon the size and sector of the scheme. Volatility of energy prices continue to have an impact on the viability of CHP. Due to the long term nature of CHP investments long term trends in the spark gap need to be taken into account.

Use of CHPQA in producing CHP statistics

7.6 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[2], 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). This point is relevant when considering the figures in Table 7D, where the power efficiencies, heat efficiencies and heat to power ratios stated in that table for 2013 are those of the scheme, which may not be just the prime mover.
- The output of a scheme is based on gross power output. This means that power consumed by parasitic plant such as pumps and fans is included in the power output of the scheme.
- The main purpose of a number of CHP schemes is the generation of electricity including export to other businesses and the grid. 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 (see www.chpqa.com). Only the output from highly-efficient or "Good Quality" schemes is counted in this chapter. Chapter 5 includes all CHP capacity, fuel inputs and power outputs, both highly-efficient or "Good Quality" and less efficient under the category, "Other generators."
- For year of operation 2011 onwards, new scale back criteria came into force in order to be consistent with the EU Cogeneration Directive. This results in a more severe scale back than was previously the case. This has contributed to some of the decrease in Good Quality electricity output and associated fuel consumption seen after 2010.
- There are two load factors presented in Table 7A. Load Factor (CHPQA) is based on the Good Quality Power Output and Good Quality Power Capacity reported in this Chapter. Load Factor (Actual) is based on the Total Power Capacity and the Total Power Output. The Load Factor (CHPQA) is lower than the Load Factor (Actual) for schemes that have been scaled back on the power outputs. The load factor gives an indication of the degree to which the power generating capacity is utilized. Since 2007, Load Factor (CHPQA) had declined in the Chemicals, Oil Refining and Paper sectors.

Efficiency of CHP schemes

7.7 Good Quality CHP denotes schemes certified as being highly efficient through the UK's CHP Quality Assurance (CHPQA) programme in line with Energy Efficiency Directive (2012/27/EU) criteria: schemes with installed capacity >1 MWe, must achieve 10 per cent primary energy savings compared with the EU reference values for separate generation of heat and power i.e. via a boiler and power station.

[2] *The CHP prime mover is the heart of a CHP system and is a mechanical machine which drives the electricity generator or develops mechanical power for direct use*

Table 7A: A summary of the recent development of CHP

	Unit	2009	2010	2011	2012	2013
Number of schemes		1,379	1,459	1,791	1,955	2,014
Net No. of schemes added during year (1)		53	80	332	164	59
Electrical capacity (CHP_{QPC})	MWe	5,492	5,950	5,969	6,175	6,170
Net capacity added during year		169	458	19	206	-5
Capacity added in percentage terms	Per cent	3.2	8.3	0.3	3.4	-0.1
Heat capacity	MWth	22,258	22,204	22,129	22,678	22,225
Heat to power ratio *(2)*		1.82	1.80	2.12	2.10	2.24
Fuel input *(3)*	GWh	111,290	112,559	98,195	99,421	96,056
Electricity generation (CHP_{QPO})	GWh	26,425	26,768	22,767	22,950	20,891
Heat generation (CHP_{QHO})	GWh	48,091	48,267	48,184	48,244	46,701
Overall efficiency *(4)*	Per cent	67.0	66.7	72.3	71.6	70.4
Load factor (CHPQA) *(3)*	Per cent	54.9	51.4	43.5	42.4	38.7
Load factor (Actual) *(5)*	Per cent	57.3	55.2	57.8	52.9	52.7

(1) Net number of schemes added = New schemes – Decommissioned existing schemes

(2) Heat to power ratios are calculated from the qualifying heat output (QHO) and the qualifying power output (QPO).

(3) The load factor (CHPQA) is based on the qualifying power generation and capacity and does not correspond exactly to the

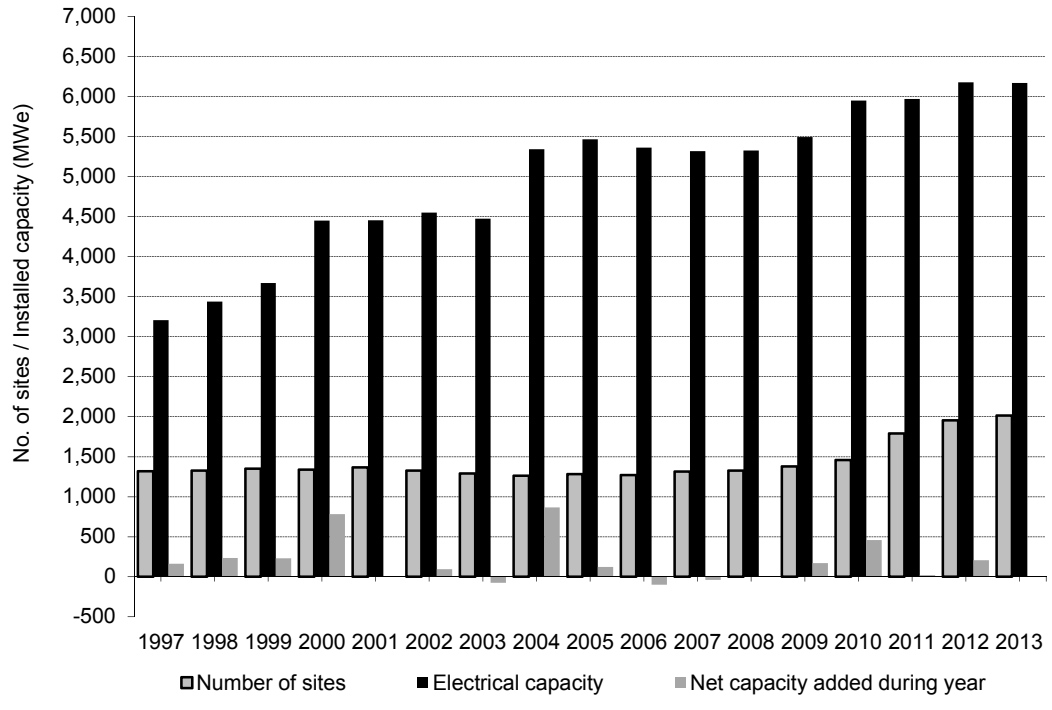
(4) Overall efficiencies are calculated using gross calorific values; overall net efficiencies are some 7 percentage points higher.

(5) The load factor (Actual) is based on the total power generated and total capacity

Changes in CHP capacity

7.8 Chart 7.1 shows the change in installed CHP capacity since 1997. Installed capacity at the end of 2013 stood at 6,170 MWe, virtually unchanged in comparison to 2012. There was a net increase of 59 schemes between 2012 and 2013 and a net decrease of 5 MWe in installed capacity. Overall, between 2012 and 2013, there were 68 new schemes included in the database and a removal of 9 schemes.

Chart 7.1: Operating CHP capacity by year



7.9 The data relating to the number of schemes and capacity in Table 7A exclude 111 mothballed schemes with a total capacity of 100 MWe. Schemes are mothballed when operators decide to discontinue operation. In the 2012 Digest and earlier, the capacity of these schemes was retained in the statistics on the basis that these schemes were still able to operate. However, starting in the 2013 Digest for 2013 all mothballed schemes have been removed from the statistics, to provide consistency with electricity capacity data.

7.10 Table 7A gives a summary of the overall CHP market. CHP schemes generated 20,891 GWh of Good Quality electricity in 2013, decreasing 9 per cent in comparison to 2012 largely due to changes in utilisation of power generating capacity in the Oil Refineries sector. This generated electricity represents 5.8 per cent of the total electricity generated in the UK.

7.11 Table 7A shows that in 2013 CHP schemes supplied a total of 46,701 GWh of heat, which was a decrease of about 3 per cent compared to 2012.

7.12 In terms of electrical capacity by size of scheme, schemes larger than 10 MWe represent about 80 per cent of the total electrical capacity of CHP schemes as shown in Table 7B. However, schemes less than 1 MWe constitute the majority (83 per cent) in terms of the number of schemes but only about 5 per cent of the capacity. Table 7.5 provides data on electrical capacity for each type of CHP installation.

Table 7B: CHP schemes by capacity size ranges in 2013

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	603	29.9	39	0.6
100 kWe - 1 MWe	1,071	53.2	270	4.4
1 MWe - 2 MWe	112	5.6	160	2.6
2 MWe - 10 MWe	159	7.9	736	11.9
> 10 MWe	69	3.4	4,965	80.5
Total	**2,014**	**100.0%**	**6,170**	**100.0%**

7.13 Table 7.5 shows nearly 70 per cent of total electrical capacity is in combined cycle gas turbine (CCGT) mode. Reciprocating engines contribute 16 per cent followed by open cycle gas turbines (OCGT) at 7 per cent.

7.14 The statistics tables presented in this Chapter exclude a number of very small CHP schemes installed since 2010 in response to the Feed-in Tariff (FiT) scheme. The overwhelming majority of these schemes are domestic. At the end of 2013 there were 477 such schemes registered with Ofgem for FiTs with a total installed capacity of 487 kWe. There are no data on electricity generation or fuel consumption and, consequently, these schemes have been left out of the statistics tables in this Chapter. However, if included, there would have a negligible impact upon the capacity and generation figures. This data is included in the tables within the electricity Chapter.

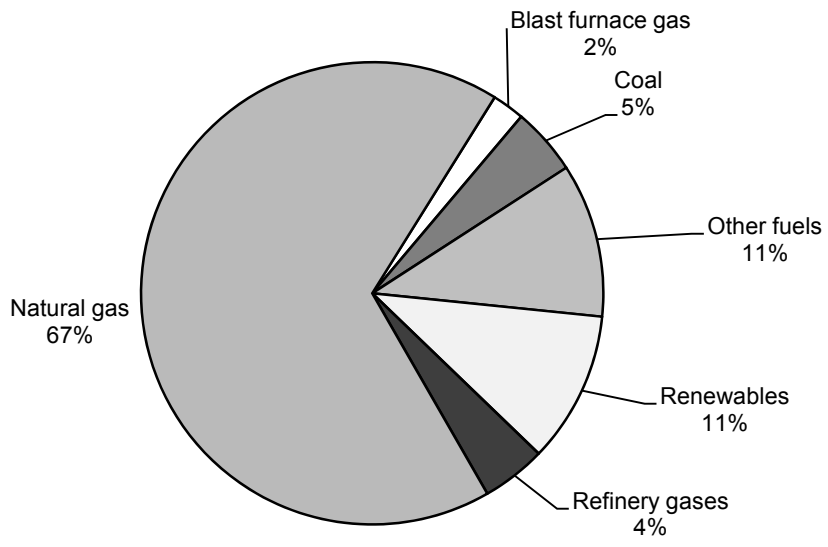
7.15 Table 7.7 provides data on heat capacity for each type of CHP installation. Starting in the 2013 edition of the Digest, there has been a change implemented in how the heat capacity has been derived for each scheme. Prior to this, for a number of schemes, the data held on heat capacity were either not complete or were not a true reflection of the capacity of the scheme to generate heat in CHP operating mode. To allow for this, a standard methodology was developed and applied for the first time in the 2013 edition of the Digest for the determination of the heat capacity of each CHP scheme. Details of this methodology may be found in paragraph 7.40.

Fuel used by types of CHP installation

7.16 Table 7.2 shows the fuel used to generate electricity and heat in CHP schemes (see paragraphs 7.37 to 7.39, below for an explanation of the convention for dividing fuel between electricity and heat production). Table 7.3 gives the overall fuel used by types of CHP installation (which are explained in paragraph 7.36). Total fuel use is summarised in Chart 7.2. In 2013, 67 per cent of the total fuel use was natural gas, compared to 71 per cent in 2012, whilst the renewables share was up to 10.5 per cent, due to an increase in use of liquid biofuels. Changes in the use of other fuels between 2012 and 2013 were mixed, but made up small percentages of the total. CHP schemes accounted for 8 per cent of UK gas demand in 2013 (see Table 4.3).

7.17 In Table 7.2, other fuels (liquids, solids or gases which are by-products or waste products from industrial processes) or are renewable fuels, accounted for 28 per cent of all fuel used in CHP in 2013. These fuels represented about 23 per cent of total fuel consumption in 2012. Between 2012 and 2013 the proportion of total fuel that was renewable and the proportion of total fuel that was by-products or waste products of industrial processes both increased. Some of these by-product fuels 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 and 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 that they need to be disposed of in some way, the use of these fuels in CHP provides environmental benefits.

Chart 7.2: Types of fuel used by CHP schemes in 2013



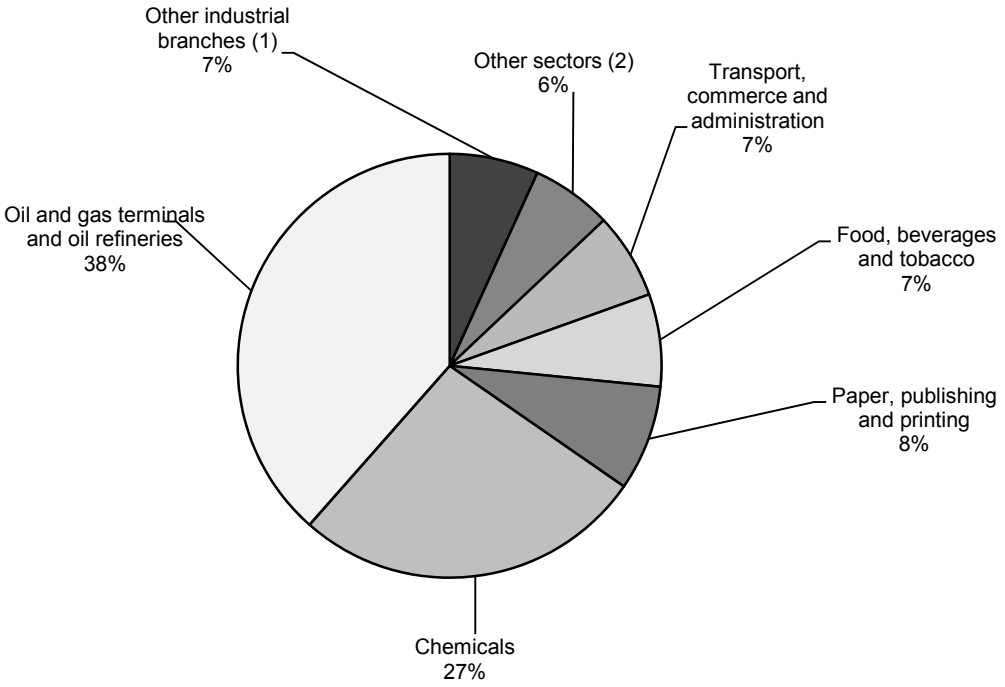
CHP capacity, output and fuel use by sector

7.18 In this chapter of the Digest CHP is analysed by the sector using the heat or, where the heat is used by more than one sector, by the sector using the majority of the heat. This method of assigning a CHP scheme to a sector was rigorously applied for the first time in the 2008 edition of the digest 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 the 2008 edition of the Digest.

7.19 Table 7.8 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 1.59 and Table 1H:

- 381 schemes (87 per cent of electrical capacity) are in the industrial sector and 1,633 schemes (13 per cent of capacity) are in the agricultural, commercial, public administration, residential and transport sectors.
- Four industrial sectors account for about 80 per cent of the CHP electrical capacity – oil refineries (38 per cent), chemicals (27 per cent), paper and publishing and printing (8 per cent) and food, beverages and tobacco (7 per cent). Capacity by sector is shown in Chart 7.3. The capacity attributed to oil refineries and food, beverages and tobacco was essentially unchanged between 2012 and 2013. The capacity attributable to Chemicals fell between 2012 and 2013 while the capacity in paper, publishing and printing grew between 2012 and 2013.

Chart 7.3: CHP electrical capacity by sector in 2013



(1) Other industrial branches includes mining, iron, steel and other metal products, textiles, clothing and footwear and sewage treatment.
(2) Other sectors includes agriculture, community heating, leisure, landfill and incineration.

7.20 Table 7C gives a summary of the 1,442 schemes installed in the commercial sector, public sector and residential buildings. These schemes form a major part of the "Transport, commerce and administration" and "Other" sectors in Tables 7.8 and 7.9. 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 the health sector (34 per cent), mainly hospitals. Leisure and hotels account for over half of all schemes associated with buildings but only 22 per cent of the capacity. Table 7.9 gives details of the quantities of fuels used in each sector.

Table 7C: Number and capacity of CHP schemes installed in buildings by sector in 2013

	Number of schemes	Electrical capacity (MWe)	Heat capacity (MWth)
Leisure	467	62.1	105.8
Hotels	263	38.2	63.0
Health	197	155.3	856.8
Residential Group Heating	87	40.9	99.5
Universities	83	72.2	420.6
Offices	40	14.4	18.7
Education	56	14.2	46.9
Government Estate	31	13.6	47.6
Retail	215	43.5	69.7
Other *(1)*	3	0.7	1.1
Total	**1,442**	**455.2**	**1,729.7**

(1) All schemes under Other are at airports

7.21 CHP is used within District Heating applications, where the heat outputs of the CHP are used to provide space heating and hot water to more than one building. In this year's Digest we provide indicative statistics for the use of CHP in District Heating applications, which will be refined in later editions of the Digest as more information is forthcoming. From the CHP statistics database and other work on District Heating within the UK, there are an estimated 147 separate CHP schemes supplying heat to District Heating schemes, with an electrical generating capacity of about 177 MWe; Chapter 7 tables include data for the schemes where this has been supplied.

CHP performance by main prime mover

7.22 Table 7D gives a summary of the performance of schemes in 2013 by main prime mover type. In 2013 the prime mover type with the highest average operating hours was gas turbines followed by reciprocating engines. Combined cycle schemes have historically had among the highest average operating hours. However, after 2009 this ceased to be the case, with additional combined cycle capacity installed but under-utilised. As such the average operating hours of the cohort of combined cycle schemes has declined steadily since 2008.

7.23 In 2013, the average operating hours across all CHP schemes were 3,386 hours, compared to 3,717 hours (revised since publication in the 2013 edition of the Digest) in 2012. This indicates a decrease in the load factor, which is consistent with the decrease in power generated mentioned earlier.

7.24 In 2013, the average electrical efficiency was 22 per cent and the heat efficiency 49 per cent, giving an overall average of 70 per cent (rounded), which is lower than the revised figure for 2012 (72 per cent).

Table 7D: A summary of scheme performance in 2013

	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	Average Load Factor (%-CHPQA)	Average Load Factor (% Actual)
Main prime mover in CHP plant							
Back pressure steam turbine	2,988	9	80	89	8.5	34%	55%
Pass out condensing steam turbine	3,444	13	46	59	3.7	36%	52%
Gas turbine	5,066	24	51	75	2.2	58%	63%
Combined cycle	3,172	23	48	71	2.1	39%	67%
Reciprocating engine	3,653	25	36	62	1.4	42%	44%
All schemes	**3,386**	**22**	**49**	**70**	**2.2**	**39%**	**53%**

CHP schemes which export and schemes with mechanical power output

7.25 Table 7E shows the electrical exports (i.e. sold to other businesses or electricity suppliers in the UK) from CHP schemes between 2011 and 2013. 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 7.6 above). Exports accounted for about 39 per cent of power generation from CHP in 2013 (compared to a revised figure of 41 per cent in 2012). Declaration of electrical exports remains voluntary under CHPQA and so the figures presented in Table 7E may be an underestimate of the true situation.

Table 7E: Electrical exports from CHP

GWh

	2011	2012	2013
To part of same qualifying group *(1)*	171	270	746
To a firm NOT part of same qualifying group	1,456	1,823	2,470
To an electricity supplier	6,745	7,210	5,024
Total	**8,372**	**9,303**	**8,240**

(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.

7.26 In 2013, 50 large schemes also exported heat, with some exporting to more than one customer. As Table 7F shows, together they supplied 9,505 GWh of heat in 2013.

Table 7F: Heat exports from CHP

GWh

	2011	2012	2013
To part of same qualifying group *(1)*	1,812	1,304	1,632
To a firm NOT part of same qualifying group	7,086	7,178	7,873
Total	**8,898**	**8,422**	**9,505**

(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.

7.27 There are an estimated 12 schemes with mechanical power output. For those schemes, mechanical power accounts for over 9 per cent of their total power capacity (Table 7G). 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 7G: CHP schemes with mechanical power output in 2013

	Unit	
Number of schemes		12
Total Power Capacity of these schemes (CHP_{TPC})	MWe	2,450
Mechanical power capacity of these schemes	MWe	231

Emissions savings

7.28 The calculation of carbon emissions savings from CHP is complex because CHP displaces a variety of fuels, technologies and sizes of plant. 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 2013 as compared to the fossil fuel basket were 14.83 $MtCO_2$, which equates to 2.40 Mt CO_2 per 1,000 MWe installed capacity. Against the total basket, CHP saved 9.34 Mt CO_2 which equates to 1.51 Mt CO_2 per 1,000 MWe installed capacity.

7.29 Corresponding figures for 2011 and 2012 are shown in Table 7H. The 2011 and 2012 CO_2 savings are revised based on revisions to the relevant data for these years in Tables 7.1, 7.4, 7.6 and 7.9 and revisions to the CO_2 intensity of grid electricity. Absolute savings (MtCO2) are sensitive to both the levels of CHP heat and power output and the CO_2 factor attributed to grid electricity that CHP electricity displaces. The lower absolute savings for 2013 compared to 2012 are a function of both the lower level of output and a lower CO_2 intensity attributed to grid electricity for 2013 compared to 2012. The higher CO_2 intensity of grid electricity in 2012 was due to higher levels of coal consumption for the generation of electricity on the grid.

Table 7H: Carbon dioxide savings due to CHP, absolute and per 1,000 MWe of installed good quality CHP capacity

	2011		2012		2013	
	$MtCO_2$	$MtCO_2$/1000 MWe	$MtCO_2$	$MtCO_2$/1000 MWe	$MtCO_2$	$MtCO_2$/1000 MWe
Carbon savings against all fossil fuels	13.32	2.23	15.76	2.55	14.83	2.4
Carbon savings against all fuels (including nuclear and renewables)	9.04	1.51	10.33	1.67	9.34	1.51

Note: (1) The CO2 savings in Table 7H 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.

(2) The CO2 savings quoted above for 2013 are based on preliminary CO2 intensities, for that year, for the fossil fuel basket and the total fuel basket of conventional electricity generation. As such, they are subject to revision at a later date. The CO2 savings quoted above for 2011 and 2012 have also been revised in response to changes in the CO2 intensity factors for electricity for these years since reporting in the 2013 Digest.The figures have also been revised to reflect revisions to CHP electricity and heat output and fuel consumption.

Government policy towards CHP

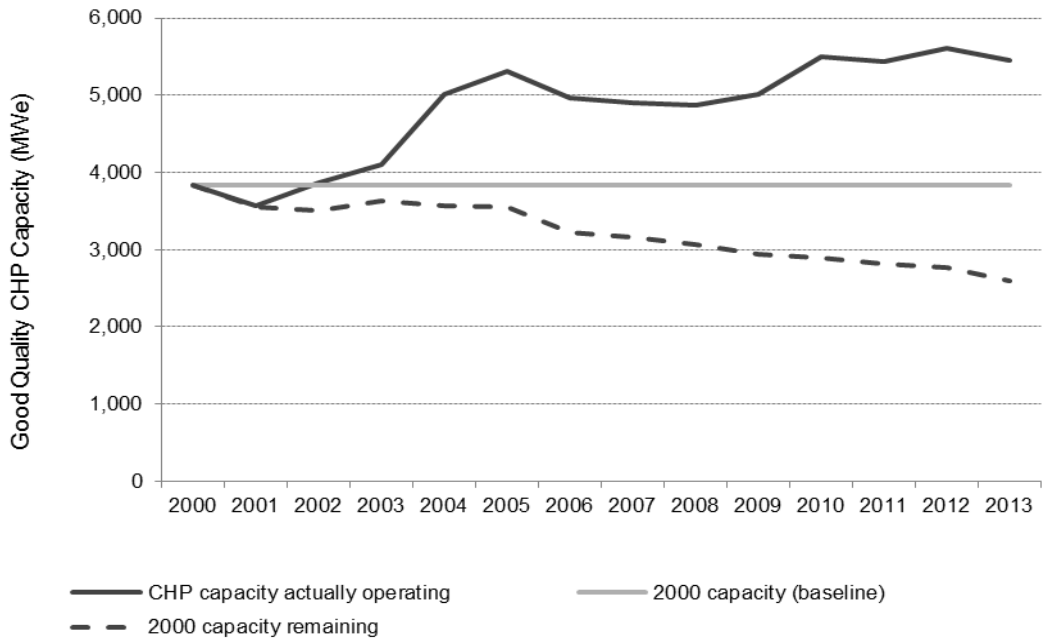
7.30 There are a range of support measures to incentivise the growth of Good Quality CHP in the UK. These include:

- Exemption from the Climate Change Levy (CCL) of all fuel inputs to, and electricity outputs from, Good Quality CHP.
- From April 2013, exemption from Carbon Price Support (CPS) on fuel to CHP consumed for the generation of heat
- From April 2015, exemption from Carbon Price Support (CPS) on fuel to CHP consumed for the generation of Good Quality CHP electricity which is consumed on site
- Eligibility to Enhanced Capital Allowances for Good Quality CHP plant and machinery.
- Business Rates exemption for CHP power generation plant and machinery.
- Reduction of VAT (from 20 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.
- Increased support under the Renewables Obligation from 1.5 to 2 ROCs for Good Quality electricity output of CHP fuelled by biomass.
- Support for anaerobic digestion fuelled-CHP (upto 5MWe) and micro-CHP (upto 2kWe) schemes through the Feed-in Tariff scheme.

- In April 2010 the Carbon Reduction Commitment (CRC) came into force. The CRC is a mandatory emissions trading scheme that covers 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 are required to purchase allowances to cover the CO_2 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 Liquified 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.

7.31 Table 7.1 shows the installed Good Quality CHP capacity in each year. However, this table hides the underlying market activity that replaces older capacity as it is taken out of service over time. Chart 7.4 gives an idea of the scale of this activity since 2000 for CHP schemes certified under CHPQA. The dotted line shows how much of the Good Quality CHPQA capacity that was in place in 2000 remained in place in subsequent years, while the upper line shows the actual Good Quality CHPQA capacity in place in each year. For any year since 2000, the gap between these two lines represents the new Good Quality CHPQA capacity installed between 2000 and that year. By 2013 there had been over 2.8 GWe of new Good Quality CHPQA capacity installed since 2000, to offset around 1.2 GWe of closures.

Chart 7.4: Underlying market activity - operating Good Quality CHP versus retained Good Quality CHP



International context

7.32 Phase III of EU ETS runs from 2013 until 2027. Allocations during this phase are for CO_2 emissions associated with the generation of heat but not with the generation of electricity generated by CHP. The benchmark for heat is based on the use of natural gas with a conversion efficiency of 90% (N.C.V.) and allocation is only made in respect of measurable heat consumed. This means that the benchmark allocation made for each MWh of heat generated by a CHP scheme and subsequently consumed is 0.224 tCO_2[3]. In 2013, a heat generating installation will have received 80% of the allocations determined using this benchmark, declining linearly to 30% by 2020 and then to 0% by 2027. Countries in the EU supply data to Eurostat on CHP power generated. These data supplied are collated according to the principles set out in Annex I of the Energy Efficiency Directive (2012/27/EU).

[3] *Where the CHP supplies heat to an EU ETS Phase III sub-installation or installation and the sub-installation or installation produces a product that is product benchmarked, then an allocation is not made in respect of the heat supplied but in respect of the product produced.*

According to Eurostat, across the EU-27 countries, 11.2% of gross electricity generated came from CHP in 2011. The figure quoted by Eurostat for the United Kingdom for 2011 is 6.3 per cent. The highest proportion of gross electricity generated coming from CHP was in Latvia and Denmark, at 47 per cent and 46 per cent, respectively. Among the larger EU-27 economies, the shares in 2011 were: Germany (13.1 per cent), Italy (11.5 per cent), Spain (7.6 per cent) and France (2.8 per cent)[4].

[4] *Indicator code: tsdcc350. See:*
http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdcc350

Technical notes and definitions

7.33 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 1.29 to 1.60.

Data for 2013

7.34 The data are summarised from the results of a long-term project undertaken by Ricardo-AEA on behalf of the Department of Energy & Climate Change (DECC). Data are included for Good Quality CHP schemes installed in all sectors of the UK economy.

7.35 Data for 2013 were based on data supplied to the CHPQA programme. Additional data came from the Iron and Steel Statistics Bureau (ISSB); Ofgem in respect of "Renewables Obligation Certificates" (ROCs); the CHP Sales database maintained by the CHPA; and from a survey of anaerobic digestion sites (AD survey). Approximately 95 per cent of the total capacity is from schemes that have been certified under the CHPQA programme. Sewage Treatment Works and other AD schemes 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 data from these sources accounts for approximately 2.7 per cent of total electrical capacity. The balance of the capacity is for schemes covered by ISSB sources (1 per cent), CHPA Sales Database (<1 per cent) and for schemes not covered by the above sources which were interpolated from historical data (<1 per cent).

Definitions of schemes

7.36 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

7.37 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 methodology based, and cannot be measured accurately.

7.38 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 is 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.

7.39 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 estimated efficiencies.

Determining heat capacity of CHP schemes

7.40 The heat capacity figures presented in this edition of the Digest and the 2013 edition of the digest were determined as follows, where:

- THC = Total Heat Capacity of Scheme (as presented in this Chapter)
- THC(FB) = Total Heat Capacity of Fired Boilers within the Scheme
- THC(HRB) = Total Heat Capacity of Heat Recovery Boilers within the Scheme
- $THC(FB)_{to\ ST}$ = Total Heat Capacity of Fired Boilers supplying steam to Scheme Steam Turbines
- $THC(HRB)_{to\ ST}$ = Total Heat Capacity of Heat Recovery Boilers supplying steam to Scheme Steam Turbines
- THC(GT or HRB) = Total Heat Capacity for the Gas Turbines or associated Heat Recovery Boilers within the Scheme
- THC(RE) = Total Heat Capacity for the engine cooling circuits of the Reciprocating Engines within the Scheme
- TPC = Total Power Capacity of the Scheme
- TPC_{ST} = Total Power Capacity of Steam Turbines within the Scheme

Pack-pressure and Pass-out Condensing Steam Turbine Systems – For schemes certified under CHPQA, the Total Heat Capacity (THC) is given by:

$$THC = THC(FB) + THC(HRB) – TPC_{ST}$$

For schemes not certified under CHPQA, the THC is given by:

$$THC = TPC \times 2.22$$

Where 2.22 is the standard heat to power ratio for steam turbines given in Annex I of the EU Directive on energy efficiency (2012/27/EU).

Combined Cycle Systems – For schemes certified under CHPQA, the Total Heat Capacity (THC) is given by:

$THC = THC(FB)_{to\ ST} + THC(HRB)_{to\ ST} - TPC_{ST}$

For schemes not certified under CHPQA, the THC is given by:

THC = TPC x 1.052

Where 1.052 is the standard heat to power ratio for combined cycle gas turbines given in Annex I of the EU Directive on energy efficiency (2012/27/EU).

Gas Turbine Systems - For schemes certified under CHPQA, the Total Heat Capacity (THC) is given by:

THC = THC(GT or HRB) + THC(FB)

For schemes not certified under CHPQA, the THC is given by:

THC = TPC x 1.81

Where 1.81 is the standard heat to power ratio for gas turbines given in Annex I of the EU Directive on energy efficiency (2012/27/EU).

Reciprocating Engine Systems – For schemes certified under CHPQA, the Total Heat Capacity (THC) is given by:

THC = THC(RE) + THC(FB) + THC(HRB)

For schemes not certified under CHPQA, the THC is given by:

THC = TPC x 1.33

Where 1.33 is the standard heat to power ratio for reciprocating engines given in Annex I of the EU Directive on energy efficiency (2012/27/EU).

The effects on the statistics of using CHPQA

7.41 Paragraph 7.10 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 7I where it is seen that 247 schemes were scaled back. For information, in 2012, 252 (revised since publication in the 2013 edition of the Digest) schemes were scaled back.

7.42 In 2013, the power output from these schemes was scaled back from a total of 33,086 GWh to 12,537 GWh. Thus 20,549 GWh of electricity is considered “power only” and not Good Quality CHP electricity The total fuel input to these schemes was 112,877 GWh of which 52,337 GWh was regarded as being for power only. For 2012, the total power output was scaled back from 35,216 GWh (revised since publication in the 2013 edition of the Digest) to 14,605 GWh.

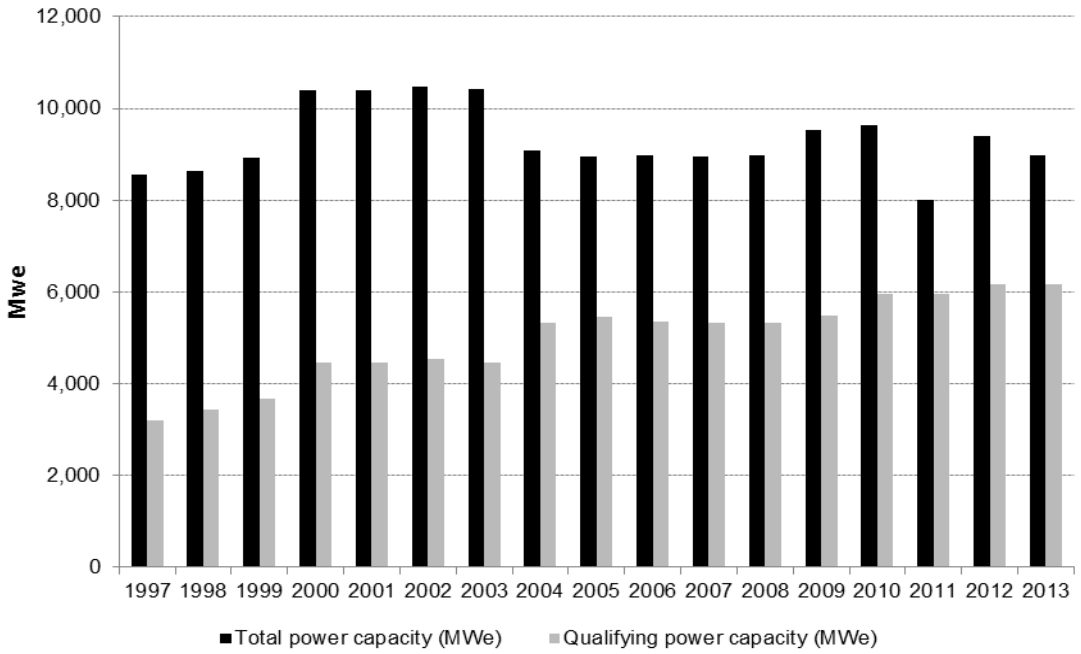
Table 7I: CHP capacity, output and fuel use which has been scaled back in 2013

	Units	
Number of schemes requiring scaling back		247
Total Power Capacity of these schemes (CHP_{TPC})	MWe	7,151
Qualifying Power Capacity of these schemes (CHP_{QPC})	MWe	4,346
Total power output of these schemes (CHP_{TPO}) *	GWh	33,086
Qualifying Power Output of these schemes (CHP_{QPO})	GWh	12,537
Electricity regarded as “Power only” not from CHP (CHP_{TPO} - CHP_{QPO})	GWh	20,549
Total Fuel Input of these schemes (CHP_{TFI})	GWh	112,877
Fuel input regarded as being for “Power only” use i.e. not for CHP	GWh	52,337

**This figure includes generation from major power producers*

7.43 The evolution of Total Power Capacity (TPC) and Qualifying Power Capacity (QPC) over time is shown in Chart 7.5.

Chart 7.5: Operating CHP capacity by year (Total versus Qualifying)



Exports of electricity and heat

7.44 The figures quoted in Tables 7E and 7F for exports of electricity and heat are based mainly on voluntary returns from schemes. As such, there is the potential for these figures to underestimate the true situation. However, and in respect of exports of electricity, all schemes participating in CHPQA, exporting to the grid and participating in the Levy Exemption Certificate (LEC) scheme are required to identify a meter recording this exported electricity. Where a site meeting these criteria has not volunteered electricity export data this meter reading is used when compiling the data presented in Table 7E. In such cases all electricity read by this meter is assumed to be exported to an electricity supplier, via the grid. If this value exceeds the QPO for the scheme, then the quantity of exported electricity is amended to QPO. For all schemes, where a value of exported electricity is volunteered this figure is used when compiling the data presented in Table 7E.

This approach for Table 7E was adopted for the first time in the 2009 edition of the digest. The data presented for previous years in this edition of DUKES have been compiled on this basis.

Exports of heat, quoted in Table 7F, continue to be compiled on the basis of volunteered data only.

Typical Power and Heat Efficiencies and Heat to Power Ratios of Prime Movers

7.45 The figures quoted above in Table 7D are for CHP schemes. These schemes may contain supplementary boilers, supplementary firing and auxiliary firing. The figures are, therefore, not reflective of the power and heat efficiencies and the heat to power ratios of the prime mover when it is considered in isolation.

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7.1 CHP installations by capacity and size range

	2009	2010	2011	2012	2013
Number of schemes *(1,2)*	**1,379r**	**1,459r**	**1,791r**	**1,955r**	**2,014**
<= 100 kWe	406	407	519	575	603
> 100 kWe to 1 MWe	706	765	960	1,053	1,071
>1 MWe to 2 MWe	72	83	98	105	112
> 2 MWe to 10 MWe	129	138	149	154	159
> 10 MWe +	66	66	65	68	69
					MWe
Total capacity	**5,492**	**5,950**	**5,969**	**6,175**	**6,170**
<= 100 kWe	**26**	**26**	**33**	**37**	**39**
> 100 kWe to 1 MWe	180	196	237	263	270
>1 MWe to 2 MWe	102	116	138	149	160
> 2 MWe to 10 MWe	634	669	694	723	736
> 10 MWe +	4,550	4,943	4,867	5,004	4,965

(1) A site may contain more than one CHP scheme; the capacity categories have changed since publication in the 2013 Digest.

(2) MicroCHP schemes installed under FIT are not included in these figures (or any subsequent figures in chapter 7). At the end of 2013 477 such schemes were registered on Ofgems Central FIT Register totalling 0.49MWe

7.2 Fuel used to generate electricity and heat in CHP installations

GWh

	2009	2010	2011	2012	2013
Fuel used to generate electricity *(1)*					
Coal *(2)*	1,545	1,484	1,616	1,738r	1,614
Fuel oil	880	694	530	586r	205
Natural gas	42,853	43,244r	35,009r	36,495r	32,547
Renewable fuels *(3)*	2,843	3,418	3,638	3,966r	5,980
Other fuels *(4)*	9,520	9,674	6,086	5,329r	5,213
Total all fuels	**57,641**	**58,513r**	**46,877r**	**48,115r**	**45,558**
Fuel used to generate heat					
Coal *(2)*	2,134	2,061	2,685	2,776r	2,877
Fuel oil	1,265	887	682	789r	268
Natural gas	34,987	35,261	33,454r	33,954r	31,677
Renewable fuels *(3)*	2,490r	3,114r	3,215	3,301r	4,135
Other fuels *(4)*	12,772	12,722	11,281	10,487r	11,541
Total all fuels	**53,649**	**54,046**	**51,318r**	**51,306r**	**50,498**
Overall fuel use					
Coal *(2)*	3,679	3,544	4,301	4,514r	4,492
Fuel oil	2,146	1,581	1,212	1,375r	473
Natural gas	77,840	78,505	68,463r	70,449r	64,223
Renewable fuels *(3)*	5,334	6,532r	6,853r	7,268r	10,115
Other fuels *(4)*	22,291	22,396	17,367	15,816r	16,753
Total all fuels	**111,290r**	**112,559r**	**98,195r**	**99,421r**	**96,056**

(1) See paragraphs 7.37 to 7.39 for an explanation of the method used to allocate fuel use between heat generation and electricity generation.
(2) Includes coke.
(3) Renewable fuels include: Biomass; 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.

7.3 Fuel used by types of CHP installation

GWh

	2009	2010	2011	2012	2013
Coal					
Back pressure steam turbine	513	549	542	518r	550
Gas turbine	-	-	-	-	-
Combined cycle	2,806	2,672	3,468	3,851r	3,837
Reciprocating engine	1	-	4	6r	6
Pass out condensing steam turbine	359	323	286	139r	99
Total coal	**3,679**	**3,544**	**4,301**	**4,514r**	**4,492**
Fuel oil					
Back pressure steam turbine	185	142	158	117r	145
Gas turbine	1	5	2	0	0
Combined cycle	1,593	1,268	916	1,114r	183
Reciprocating engine	131	119	118	122	123
Pass out condensing steam turbine	235	47	18	22r	21
Total fuel oil	**2,146**	**1,581**	**1,212**	**1,375r**	**473**
Natural gas					
Back pressure steam turbine	1,727	1,659	1,549	1,305r	1,331
Gas turbine	8,945	9,023	9,176	9,411r	9,116
Combined cycle	59,362	58,833	48,640	49,957r	44,119
Reciprocating engine	7,534	8,599	8,767r	9,402r	9,272
Pass out condensing steam turbine	272	391	330	374r	386
Total natural gas	**77,840**	**78,505**	**68,463r**	**70,449r**	**64,223**
Renewable fuels *(1)*					
Back pressure steam turbine	1,339	1,507	1,413	1,527r	1,422
Gas turbine	4	5	11	6	11
Combined cycle	562	584	514	344r	267
Reciprocating engine	1,725	2,120r	2,609r	2,815r	4,776
Pass out condensing steam turbine	1,704	2,315	2,306	2,576r	3,638
Total renewable fuels	**5,334**	**6,532r**	**6,853r**	**7,268r**	**10,115**
Other fuels *(2)*					
Back pressure steam turbine	4,932	4,564	3,409	3,175r	3,210
Gas turbine	581	537	222	209r	168
Combined cycle	13,535	13,910	11,596	9,751r	10,529
Reciprocating engine	48	97	93	69r	100
Pass out condensing steam turbine	3,196	3,288	2,047	2,613r	2,747
Total other fuels	**22,291**	**22,396**	**17,367**	**15,816r**	**16,753**
Total - all fuels					
Back pressure steam turbine	8,696	8,421	7,072	6,642r	6,657
Gas turbine	9,531	9,570	9,410	9,626r	9,295
Combined cycle	77,859	77,267	65,134	65,016r	58,937
Reciprocating engine	9,439	10,936r	11,592r	12,413r	14,277
Pass out condensing steam turbine	5,765	6,364	4,986	5,724r	6,890
Total all fuels	**111,290**	**112,559r**	**98,195r**	**99,421r**	**96,056**

(1) Renewable fuels include: Biomass; sewage gas, other biogases, municipal solid waste and derived fuels.

(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.

7.4 CHP - electricity generated by fuel and type of installation

GWh

	2009	2010	2011	2012	2013
Coal					
Back pressure steam turbine	52	64	60	62r	63
Gas turbine	-	-	-	-	-
Combined cycle	538	513	577	647	582
Reciprocating engine	0	-	1	1r	1
Pass out condensing steam turbine	19	28	20	1r	7
Total coal	**610**	**604**	**659**	**710r**	**654**
Fuel oil					
Back pressure steam turbine	20	18	19	14r	17
Gas turbine	0	1	0	0	0
Combined cycle	309	260	194	224r	37
Reciprocating engine	45	41	41	41	42
Pass out condensing steam turbine	33	6	1	1	1
Total fuel oil	**408**	**325**	**255**	**282r**	**96**
Natural gas					
Back pressure steam turbine	125	126	121	126r	122
Gas turbine	2,042	2,096	2,169	2,262r	2,152
Combined cycle	15,962	15,797	12,776	12,894r	10,947
Reciprocating engine	1,949	2,194	2,357	2,560r	2,501
Pass out condensing steam turbine	20	40	24	8r	33
Total natural gas	**20,097**	**20,253**	**17,447**	**17,850r**	**15,754**
Renewable fuels *(1)*					
Back pressure steam turbine	201	214	218	214r	204
Gas turbine	1	1	2	1	2
Combined cycle	16	11	4	10r	13
Reciprocating engine	526	601	760	839	1,030
Pass out condensing steam turbine	327	442	419	441r	704
Total renewable fuels	**1,071**	**1,269r**	**1,402**	**1,506r**	**1,953**
Other fuels *(2)*					
Back pressure steam turbine	604	556	226	214	219
Gas turbine	131	102	41	38	31
Combined cycle	3,107	3,244	2,612	2,159r	2,038
Reciprocating engine	12	25	25	18r	23
Pass out condensing steam turbine	385	389	100	174r	122
Total other fuels	**4,239**	**4,317**	**3,004**	**2,604r**	**2,434**
Total - all fuels					
Back pressure steam turbine	1,002	978	643	630r	626
Gas turbine	2,174	2,201	2,212	2,301r	2,186
Combined cycle	19,933	19,824	16,163	15,934r	13,617
Reciprocating engine	2,533	2,862	3,184	3,459r	3,595
Pass out condensing steam turbine	784	903	564	626r	867
Total all fuels	**26,425**	**26,768**	**22,767r**	**22,950r**	**20,891**

(1) Renewable fuels include: Biomass; 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.

7.5 CHP - electrical capacity by fuel and type of installation

MWe

	2009	2010	2011	2012	2013
Coal					
Back pressure steam turbine	19	20	20	20	20
Gas turbine	-	-	-	-	-
Combined cycle	159	152	282	314	336
Reciprocating engine	0	-	0	1r	1
Pass out condensing steam turbine	6	4	4	3r	2
Total coal	**184**	**176**	**306**	**338**	**359**
Fuel oil					
Back pressure steam turbine	7	6	6	6	6
Gas turbine	0	0	0	0	0
Combined cycle	70	55	41	53r	11
Reciprocating engine	8	7	7	6	7
Pass out condensing steam turbine	5	1	1	1	1
Total fuel oil	**90**	**70**	**55**	**65r**	**24**
Natural gas					
Back pressure steam turbine	39	36	31	39r	38
Gas turbine	400	390	401	412r	422
Combined cycle	3,195	3,509	3,308	3,428r	3,219
Reciprocating engine	565	619	676	719r	734
Pass out condensing steam turbine	5	6	6	7r	9
Total natural gas	**4,203**	**4,560**	**4,423**	**4,605r**	**4,421**
Renewable fuels *(1)*					
Back pressure steam turbine	35	37	38	39	37
Gas turbine	0	0	1	0	1
Combined cycle	3	3	3	4r	4
Reciprocating engine	128	131	175	195r	225
Pass out condensing steam turbine	71	85	88	105r	166
Total renewable fuels	**237**	**257**	**306**	**344r**	**433**
Other fuels *(2)*					
Back pressure steam turbine	109	109	109	107	108
Gas turbine	19	28	13	12	9
Combined cycle	581	653	659	605r	724
Reciprocating engine	5	24	23	22	18
Pass out condensing steam turbine	64	74	76	77r	74
Total other fuels	**778**	**888**	**880**	**823r**	**933**
Total - all fuels					
Back pressure steam turbine	210	209	205	211r	210
Gas turbine	419	418	415	425r	431
Combined cycle	4,009	4,372	4,293	4,403r	4,293
Reciprocating engine	705	781	881r	943r	984
Pass out condensing steam turbine	151	170	175	193r	252
Total all fuels	**5,492**	**5,950**	**5,969r**	**6,175r**	**6,170**

(1) Renewable fuels include: Biomass; 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.

7.6 CHP - heat generated by fuel and type of installation

GWh

	2009	2010	2011	2012	2013
Coal					
Back pressure steam turbine	367	421	421	405r	434
Gas turbine	-	-	-	-	-
Combined cycle	1,108	1,080	1,558	1,780	1,811
Reciprocating engine	0	-	2	3r	3
Pass out condensing steam turbine	300	275	274	111r	89
Total coal	**1,775**	**1,777**	**2,255**	**2,299r**	**2,337**
Fuel oil					
Back pressure steam turbine	136	117	134	98r	121
Gas turbine	1	2	1	0	0
Combined cycle	875	660	481	615r	84
Reciprocating engine	40	36	35	35	36
Pass out condensing steam turbine	109	21	10	14	13
Total fuel oil	**1,160**	**835**	**660**	**761r**	**254**
Natural gas					
Back pressure steam turbine	1,282	945	1,139	1,183r	1,199
Gas turbine	4,282	4,426	4,773	4,689r	4,681
Combined cycle	23,657	23,313	22,684	22,773r	20,569
Reciprocating engine	3,299	3,858	3,775r	4,249r	4,261
Pass out condensing steam turbine	170	277	278	268r	293
Total natural gas	**32,690**	**32,819**	**32,649r**	**33,162r**	**31,002**
Renewable fuels *(1)*					
Back pressure steam turbine	745	728	718	712r	721
Gas turbine	2	3	2	3	2
Combined cycle	77	79	57	70r	82
Reciprocating engine	509r	612	727r	779r	880
Pass out condensing steam turbine	432	701	688	757r	1,144
Total renewable fuels	**1,765r**	**2,122**	**2,193r**	**2,321r**	**2,828**
Other fuels *(2)*					
Back pressure steam turbine	2,879	2,754	3,023	2,820r	2,835
Gas turbine	233	271	127	108	93
Combined cycle	6,129	6,147	6,044	5,052r	5,680
Reciprocating engine	14	23	17	17r	27
Pass out condensing steam turbine	1,445	1,518	1,216	1,704	1,645
Total other fuels	**10,700**	**10,714**	**10,426**	**9,700r**	**10,279**
Total - all fuels					
Back pressure steam turbine	5,409	4,966	5,434	5,218r	5,309
Gas turbine	4,518	4,702	4,903	4,800r	4,776
Combined cycle	31,846	31,278	30,825	30,289r	28,225
Reciprocating engine	3,862r	4,529	4,556r	5,083r	5,206
Pass out condensing steam turbine	2,456	2,792	2,466	2,854r	3,184
Total all fuels	**48,091r**	**48,267**	**48,184r**	**48,244r**	**46,701**

(1) Renewable fuels include: Biomass; 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.

7.7 CHP - heat capacity by fuel and type of installation

MWth

	2009	2010	2011	2012	2013
Coal					
Back pressure steam turbine	118	125	122	125r	124
Gas turbine	-	-	-	-	-
Combined cycle	375	351	595	565r	583
Reciprocating engine	0	-	3	5r	5
Pass out condensing steam turbine	118	93	90	57r	46
Total coal	**611**	**569**	**809**	**752r**	**758**
Fuel oil					
Back pressure steam turbine	49	44	43	40r	42
Gas turbine	0	1	0	0	0
Combined cycle	262	201	145	194r	29
Reciprocating engine	9	8	7	12	13
Pass out condensing steam turbine	45	10	7	5	5
Total fuel oil	**365**	**263**	**203**	**250r**	**88**
Natural gas					
Back pressure steam turbine	527	447	446	465r	467
Gas turbine	1,788	1,682	1,717	1,753	1,764
Combined cycle	10,575	10,427	9,973	10,648r	10,012
Reciprocating engine	2,235	2,432	2,530	2,584r	2,576
Pass out condensing steam turbine	72	101	99	133r	139
Total natural gas	**15,196**	**15,088**	**14,764r**	**15,583r**	**14,958**
Renewable fuels *(1)*					
Back pressure steam turbine	130	134	137	143r	137
Gas turbine	1	1	3	2	4
Combined cycle	1,555	1,525	1,598	1,620r	1,599
Reciprocating engine	180	184	198r	211r	211
Pass out condensing steam turbine	333	407	519	517	542
Total renewable fuels	**2,199**	**2,252**	**2,456r**	**2,493r**	**2,493**
Other fuels *(2)*					
Back pressure steam turbine	965	964	964	944	947
Gas turbine	83	165	54	48	35
Combined cycle	2,203	2,204	2,171	1,900r	2,257
Reciprocating engine	9	21	18	17r	18
Pass out condensing steam turbine	625	678	687	690	670
Total other fuels	**3,885**	**4,031**	**3,895**	**3,599r**	**3,928**
Total - all fuels					
Back pressure steam turbine	1,789	1,713	1,713	1,717	1,717
Gas turbine	1,872	1,849	1,774	1,803	1,803
Combined cycle	14,969	14,709	14,483	14,927r	14,480
Reciprocating engine	2,433	2,644	2,756r	2,828r	2,822
Pass out condensing steam turbine	1,193	1,289	1,402	1,402	1,402
Total all fuels	**22,258**	**22,204**	**22,129r**	**22,678r**	**22,225**

(1) Renewable fuels include: Biomass; 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.

7.8 CHP capacity, output and total fuel use[(1)] by sector

	Unit	2009	2010	2011	2012	2013
Iron and steel and non ferrous metals						
Number of sites		6r	6r	6r	6r	6
Electrical capacity	MWe	76r	80r	81r	81r	81
Heat capacity	MWth	674r	674r	674r	674r	674
Electrical output	GWh	463r	438r	144r	212r	162
Heat output	GWh	1,585r	1,571r	1,263r	1,764r	1,702
Fuel use	GWh	3,558r	3,451r	2,197r	2,766r	2,887
of which : for electricity	GWh	1,225r	1,196r	369r	484r	436
for heat	GWh	2,333r	2,255r	1,828r	2,282r	2,451
Chemicals						
Number of sites		44	49	53	53	52
Electrical capacity	MWe	1,764	1,772	1,755	1,746r	1,658
Heat capacity	MWth	5,739	5,642	5,664	5,546	5,323
Electrical output	GWh	7,204	7,486	6,689	6,501r	5,805
Heat output	GWh	14,173	14,944	15,287	14,878r	14,125
Fuel use	GWh	33,401	34,717	31,978	31,328r	29,071
of which : for electricity	GWh	17,093	17,563	14,932	14,734r	13,246
for heat	GWh	16,308	17,154	17,046	16,594r	15,825
Oil and gas terminals and oil refineries						
Number of sites		9	11	11	11r	11
Electrical capacity	MWe	1,864	2,293	2,298	2,380r	2,375
Heat capacity	MWth	6,858	7,039	7,039	7,600r	7,600
Electrical output	GWh	10,672	10,999	8,239	8,105r	6,616
Heat output	GWh	16,727	16,903	16,786	16,211r	14,959
Fuel use	GWh	39,766	40,536	30,964	31,340r	27,939
of which : for electricity	GWh	21,898	22,501	14,998	15,486r	13,007
for heat	GWh	17,868	18,035	15,965	15,854r	14,932
Paper, publishing and printing						
Number of sites		23	22	21	23r	23
Electrical capacity	MWe	508	476	407	453r	497
Heat capacity	MWth	2,338	2,072	1,857	1,857	1,633
Electrical output	GWh	2,710	2,255	2,020	2,170r	2,169
Heat output	GWh	5,966	5,102	4,806	4,875r	5,052
Fuel use	GWh	12,179	10,417	9,299	9,448r	9,598
of which : for electricity	GWh	5,769	4,871	4,250	4,553r	4,582
for heat	GWh	6,409	5,546	5,049	4,895r	5,015
Food, beverages and tobacco						
Number of sites		37r	39r	45r	48r	52
Electrical capacity	MWe	404r	407r	427r	437r	435
Heat capacity	MWth	1,744r	1,718r	1,678r	1,708r	1,708
Electrical output	GWh	2,107r	2,105r	2,115r	2,135r	2,114
Heat output	GWh	4,359r	3,765r	4,109r	4,040r	4,207
Fuel use	GWh	8,723r	8,289r	8,283r	8,102r	8,320
of which : for electricity	GWh	4,248r	4,394r	4,199r	4,156r	4,194
for heat	GWh	4,476r	3,895r	4,084r	3,946r	4,126
Metal products, machinery and equipment						
Number of sites		16	16	19	19	20
Electrical capacity	MWe	67	67	69	68	75
Heat capacity	MWth	287	287	288	288	288
Electrical output	GWh	172	174	94	106r	118
Heat output	GWh	196	206	149	159r	168
Fuel use	GWh	558	634	581	603r	592
of which : for electricity	GWh	342	383	250	270r	282
for heat	GWh	216	251	331	332r	310

For footnotes see page 218

7.8 CHP capacity, output and total fuel use[1] by sector (continued)

	Unit	2009	2010	2011	2012	2013
Mineral products, extraction, mining and agglomeration of solid fuels						
Number of sites		8	8	8	8	8
Electrical capacity	MWe	57	57	57	54r	54
Heat capacity	MWth	184	183	183	183	183
Electrical output	GWh	137	134	111	102r	104
Heat output	GWh	502	577	544	494r	526
Fuel use	GWh	915	971	892	816r	835
of which : for electricity	GWh	325	318	258	236r	230
for heat	GWh	590	653	634	580r	605
Sewage treatment						
Number of sites		166	171	193r	200r	198
Electrical capacity	MWe	145	150r	166r	174r	164
Heat capacity	MWth	223r	227r	230r	241r	228
Electrical output	GWh	600r	646r	693r	690r	727
Heat output	GWh	598r	677r	748r	746r	794
Fuel use	GWh	2,006r	2,320r	2,519r	2,483r	4,009
of which : for electricity	GWh	1,353r	1,534r	1,640r	1,617r	2,656
for heat	GWh	653r	786r	879r	866r	1,353
Other industrial branches *(2)*						
Number of sites		8	10	12r	11r	11
Electrical capacity	MWe	41	42	45r	46r	46
Heat capacity	MWth	154	155	254r	254r	254
Electrical output	GWh	245	223	224r	213r	207
Heat output	GWh	340	358	384r	374r	381
Fuel use	GWh	862	836	1,000r	1,182r	1,103
of which : for electricity	GWh	516	469	547r	621r	564
for heat	GWh	346	367	453r	562r	540
Total industry						
Number of sites		317	332	368r	379r	381
Electrical capacity	MWe	4,926	5,345r	5,306r	5,438r	5,384
Heat capacity	MWth	18,199r	17,997r	17,868r	18,352r	17,892
Electrical output	GWh	24,310r	24,461r	20,329r	20,233r	18,022
Heat output	GWh	44,446r	44,103r	44,075r	43,540r	41,915
Fuel use	GWh	101,968r	102,171r	87,714r	88,068r	84,355
of which : for electricity	GWh	52,770r	53,230r	41,443r	42,158r	39,197
for heat	GWh	49,198r	48,941r	46,270r	45,911r	45,157
Transport, commerce and administration						
Number of sites		586	653	839r	936r	947
Electrical capacity	MWe	286	319	345r	400r	406
Heat capacity	MWth	1,403	1,541	1,555r	1,608r	1,613
Electrical output	GWh	1,183	1,328	1,399r	1,698r	1,703
Heat output	GWh	2,174	2,590	2,573r	2,986r	2,959
Fuel use	GWh	4,909	5,715	5,811r	6,933r	6,921
of which : for electricity	GWh	2,534	2,877	2,990r	3,695r	3,753
for heat	GWh	2,375	2,838	2,822r	3,238r	3,167
Other *(3)*						
Number of sites		476r	474r	584r	640r	686
Electrical capacity	MWe	279r	287r	318	337r	380
Heat capacity	MWth	2,655r	2,666r	2,705r	2,719r	2,721
Electrical output	GWh	932r	979r	1,039r	1,020r	1,167
Heat output	GWh	1,471r	1,574r	1,536	1,718r	1,827
Fuel use	GWh	4,412r	4,673r	4,670r	4,419r	4,781
of which : for electricity	GWh	2,337r	2,407r	2,444r	2,262r	2,608
for heat	GWh	2,076r	2,266r	2,226r	2,158r	2,173
Total CHP usage by all sectors						
Number of sites		1,379r	1,459r	1,791r	1,955r	2,014
Electrical capacity	MWe	5,492	5,950	5,969r	6,175r	6,170
Heat capacity	MWth	22,258	22,204	22,129r	22,678r	22,225
Electrical output	GWh	26,425	26,768	22,767r	22,950r	20,891
Heat output	GWh	48,091r	48,267	48,184r	48,244r	46,701
Fuel use	GWh	111,290r	112,559r	98,195r	99,421r	96,056
of which : for electricity	GWh	57,641	58,513r	46,877	48,115r	45,558
for heat	GWh	53,649	54,046	51,318r	51,306r	50,498

(1) The allocation of fuel use between electricity and heat is largely notional and the methodology is outlined in paragraphs 7.37 to 7.39.

(2) Other industry includes Textiles, clothing and footwear sector.

(3) Sectors included under Other are agriculture, community heating, leisure, landfill and incineration.

7.9 CHP - use of fuels by sector

GWh

	2009	2010	2011	2012	2013
Iron and steel and non ferrous metals					
Coal	-	-	-	-	-
Fuel oil	235	47	18	22r	21
Natural gas	266r	263r	221r	225r	207
Blast furnace gas	2,232	1,920	1,397	1,892r	2,169
Coke oven gas	826	1,221	486	599r	489
Other fuels *(1)*	-	-	75	29r	2
Total iron and steel and non ferrous metals	**3,558r**	**3,451r**	**2,197r**	**2,766r**	**2,887**
Chemicals					
Coal	3,103	3,016	3,783	4,178r	4,176
Fuel oil	132	132	131	133r	137
Gas oil	11	189	43	5r	4
Natural gas	26,487	27,230	23,778	23,340r	20,986
Refinery gas	1,181	1,181	1,181	556r	646
Renewable fuels *(2)*	3	81	33	27r	14
Other fuels *(1)*	2,485	2,888	3,029	3,089r	3,108
Total chemical industry	**33,401**	**34,717**	**31,978**	**31,328r**	**29,071**
Oil and gas terminals and oil refineries					
Fuel oil	1,464	1,140	789	983r	48
Gas oil	159	141	106	52	749
Natural gas	23,240	25,008	19,520	21,260r	18,159
Refinery gas	5,795	7,335	5,618	3,774r	3,653
Other fuels *(1)*	9,108	6,912	4,931	5,272r	5,329
Total oil refineries	**39,766**	**40,536**	**30,964**	**31,340r**	**27,939**
Paper, publishing and printing					
Coal	359	323	286	139r	99
Fuel oil	0	-	0	0r	-
Gas oil	23	13	2	6r	12
Natural gas	10,124	8,024	7,227	7,455r	6,806
Renewable fuels *(2)*	1,590	1,905	1,620	1,643r	2,480
Other fuels *(1)*	83	151	164	204r	201
Total paper, publishing and printing	**12,179**	**10,417**	**9,299**	**9,448r**	**9,598**
Food, beverages and tobacco					
Coal	194	186	209	181r	205
Fuel oil	183	142	157	116r	143
Gas oil	44	93	32	19	20
Natural gas	8,283r	7,803r	7,785r	7,642r	7,643
Renewable fuels *(2)*	18	66	99	144r	309
Other fuels *(1)*	2	0	2	-r	-
Total food, beverages and tobacco	**8,723r**	**8,289r**	**8,283r**	**8,102r**	**8,320**
Metal products, machinery and equipment					
Coal	-	-	-	-	-
Fuel oil	89	89	89	89	89
Gas oil	0	0	0	0	0
Natural gas	434	478	412	439r	462
Renewable fuels *(2)*	34	67	80	75r	41
Other fuels *(1)*	-	-	-	-	-
Total metal products, machinery and equipment	**558**	**634**	**581**	**603r**	**592**

For footnotes see page 220

7.9 CHP - use of fuels by sector (continued)

GWh

	2009	2010	2011	2012	2013
Mineral products, extraction, mining and agglomeration of solid fuels					
Coal	-	-	-	-	-
Fuel oil	-	-	-	-	-
Gas oil	3	1	-	-	-
Natural gas	624	707	663	586r	605
Coke oven gas	288	264	229	230	230
Total mineral products, extraction, mining and agglomeration of solid fuels	**915**	**971**	**892**	**816r**	**835**
Sewage treatment					
Fuel oil	30	29	29	32	32
Gas oil	27	40	37	32r	67
Natural gas	215	190r	197	181r	36
Renewable fuels *(2)*	1,733r	2,062r	2,256r	2,238r	3,874
Total sewage treatment	**2,006r**	**2,320r**	**2,519r**	**2,483r**	**4,009**
Other industrial branches					
Fuel oil	-	-	-	-	-
Gas oil	0	0	1	14	1
Natural gas	862	836	817	762r	742
Renewable fuels *(2)*	-	-	183	406r	361
Total other industrial branches	**862**	**836**	**1,000r**	**1,182r**	**1,103**
Transport, commerce and administration					
Coal	-	-	-	-	-
Fuel oil	11	1	0	0	0
Gas oil	16	18	2	17r	18
Natural gas	4,712	5,268	5,332r	6,028r	6,014
Refinery gas	-	-	-	-	-
Renewable fuels *(2)*	170	421	471	884r	887
Other fuels *(1)*	-	7	6	5r	2
Total transport, commerce and administration	**4,909**	**5,715**	**5,811r**	**6,933r**	**6,921**
Other *(3)*					
Coal	24	19	23	16r	12
Fuel oil	1	1	-	0	2
Gas oil	9	18	15r	10r	14
Natural gas	2,593r	2,699r	2,510r	2,531r	2,563
Renewable fuels *(2)*	1,785r	1,930r	2,112r	1,851r	2,149
Other fuels *(1)*	-	5	11	10	41
Total other	**4,412r**	**4,673r**	**4,670r**	**4,419r**	**4,781**
Total - all sectors					
Coal	3,679	3,544	4,301	4,514r	4,492
Fuel oil	2,146	1,581	1,212	1,375r	473
Gas oil	292	514	238	156r	884
Natural gas	77,840	78,505	68,463r	70,449r	64,223
Blast furnace gas	2,232	1,920	1,397	1,892r	2,169
Coke oven gas	1,114	1,484	715	829r	719
Refinery gas	6,976	8,515	6,798	4,329r	4,300
Renewable fuels *(2)*	5,334	6,532r	6,853r	7,268r	10,115
Other fuels *(1)*	11,679	9,962	8,217	8,609r	8,683
Total CHP fuel use	**111,290r**	**112,559r**	**98,195r**	**99,421r**	**96,056**

(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.

Digest of United Kingdom Energy Statistics 2014

Annexes

Annex A: Energy and commodity balances, conversion factors and calorific values

Annex B: Glossary and acronyms

Annex C: Further sources of UK energy publications

Annex D: Major events in the Energy Industry, 2012-2014

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.

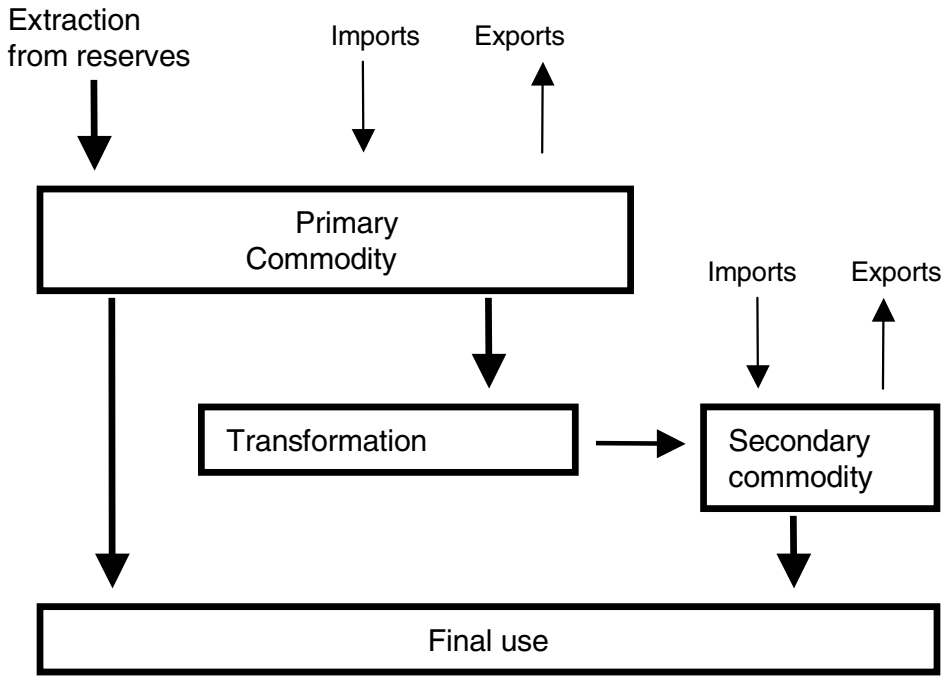
A.5 A simplified model of the commodity flow underlying the balance structure is given in Chart A.1. It illustrates how primary commodities may be used directly and/or be transformed into secondary commodities. The secondary fuels then enter final consumption or may also be transformed into another energy 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 2.3, 3.1 to 3.4, 4.1, 5.1, 5.2 and 6.1 to 6.3)

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 their 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 section 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 section 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* section 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 section are identical to those used in the transformation section 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 section. 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 (SIC2007).* The qualifications to, and constraints on, the classification are described in the technical notes to Chapter 1. Table 1G in Chapter 1 shows the breakdown of final consumers used, and how this corresponds to the SIC2007.

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 section of the commodity balances.

A.35 The amounts of coal used for coke manufacture by the iron and steel industry are in the transformation section 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 may include some fuel that is actually consumed in some "off-road" activities. Similarly, figures for railway fuels may include some amounts of burning oil not used directly for transport purposes. Transport sector use of electricity includes electricity used by rail companies (both over and underground) for traction purposes, and electricity used by electric road vehicles. The electricity used for non-traction purposes in industries classified to SIC2007 Groups 49 to 51 is included within the commercial sector. 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 and transport*, follows *SIC2007* and is described in Table 1G 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 eg 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 rearrangements 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 the 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, solar photovoltaics). 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 section 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, photovoltaics 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 and photovoltaics. 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 section 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, electricity from wind generation and from solar photovoltaics. 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 39.3 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 this electricity is in 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, bioenergy and waste* 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 section, 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 10^9

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 = 1.120 sh tn

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)
1 UK gallon	= 8 UK pints = 1.201 US gallons (US gal) = 4.54609 litres
1 barrel	= 159.0 litres = 34.97 UK gal = 42 US gal

LENGTH

1 mile	= 1.6093 kilometres
1 kilometre (km)	= 0.62137 miles

TEMPERATURE

1 scale degree Celsius (C)	= 1.8 scale degrees Fahrenheit (F)

For conversion of temperatures: $^{o}C = 5/9 (^{o}F - 32)$; $^{o}F = 9/5\ ^{o}C + 32$

Average conversion factors for petroleum 2013

	Litres per tonne
Crude oil:	
Indigenous	1,199
Imported	1,181
Average of refining throughput	1,192
Ethane	2,730
Propane	1,961
Butane	1,734
Naphtha	1,472
Aviation gasoline	1,406
Motor spirit:	
All grades	1,368
Super	1,359
Premium	1,369
Middle distillate feedstock	1,093
Kerosene:	
Aviation turbine fuel	1,253
Burning oil	1,250

	Litres per tonne
DERV fuel:	
0.005% or less sulphur	1,192
Gas /Marine diesel oil	1,172
Fuel oil (1% or less sulphur)	
All grades:	1,014
Light:	..
Medium	..
Heavy:	..
Lubricating oils:	
White	1,143
Greases	..
Bitumen	987
Petroleum coke	..
Petroleum waxes	1,184
Industrial spirit	1,247
White spirit	1,282

Note: The above conversion factors, which for refined products have been compiled by DECC using data from UK Petroleum Industry Association companies, apply to the year 2013. The litres to tonnes conversions are made at a standard temperature of 15°C.

.. Denotes commercially sensitive as too few companies are producting this to be able to report it.

Fuel conversion factors for converting fossil fuels to carbon dioxide, 2013

	kg CO_2 per tonne	kg CO_2 per kWh	kg CO_2 per litre
Gases			
Natural Gas		0.185	
LPG		0.214	1.500
Liquid fuels			
Gas oil	3190	0.254	2.726
Fuel oil	3230	0.268	
Burning oil	3150	0.245	2.526
Naptha	3131	0.236	
Petrol	3135	0.239	2.292
Diesel	3164	0.249	2.648
Aviation spirit	3128	0.238	2.232
Aviation turbine fuel	3150	0.245	2.518
Solid fuels			
Industrial coal	2308	0.309	
Domestic coal	2479	0.296	
Coking coal	3010	0.340	

All emission factors are based on a Gross Calorific Value basis

The information above is based on the 2014 Greenhouse gas conversion factors for company reporting, available at: www.ukconversionfactorscarbonsmart.co.uk/. 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 2013 edition of this Digest, available at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes together with information from the National Atmospheric Emissions Inventory. More information on the Inventory is available at: http://naei.defra.gov.uk/reports/. For liquid fuels, the "kg CO_2 per tonne" figure remains fairly constant on a year to year basis, so it is possible to derive "kg CO_2 per kWh" and "kg CO_2 per litre" figures for other years using the average conversion factors for petroleum data contained annually in Annex A of the Digest.

A.1 Estimated average calorific values of fuels 2013

	GJ per tonne net	GJ per tonne gross
Coal:		
All consumers (weighted average) *(1)*	25.7	27.0
Power stations *(2)*	24.0	25.2
Coke ovens *(1)*	30.2	31.8
Low temperature carbonisation plants and manufactured fuel plants	27.0	28.5
Collieries	27.5	29.0
Agriculture	28.1	29.5
Iron and steel	28.9	30.4
Other industries (weighted average)	25.5	26.8
Non-ferrous metals	23.8	25.1
Food, beverages and tobacco	27.9	29.4
Chemicals	25.2	26.5
Textiles, clothing, leather etc.	28.1	29.5
Pulp, paper, printing etc.	23.0	24.2
Mineral products	26.4	27.8
Engineering (mechanical and electrical engineering and vehicles)	28.0	29.5
Other industries	31.0	32.6
Domestic		
House coal	28.7	30.2
Anthracite and dry steam coal	32.6	34.3
Other consumers	25.0	26.3
Imported coal (weighted average)	26.0	27.4
Exports (weighted average)	30.7	32.3
Coke (including low temperature carbonisation cokes)	29.8	29.8
Coke breeze	29.8	29.8
Other manufactured solid fuel	28.3	29.8

	GJ per tonne net	GJ per tonne gross	Moisture content
Renewable sources:			
Domestic wood *(3)*	13.3	14.9	20.0%
Industrial wood *(4)*	17.3	18.6	0.0%
Straw	13.4	15.8	15.0%
Poultry litter (5)	7.6	9.1	16.0%
Meat and bone	16.8	20.0	16.0%
General industrial waste	15.2	16.0	5.0%
Hospital waste	13.3	14.0	5.0%
Municipal solid waste *(6)*	6.6	9.5	30.0%
Refuse derived waste *(6)*	13.0	18.5	30.0%
Short rotation coppice *(7)*	11.4	13.0	16.0%
Tyres	30.4	32.0	5.0%
Wood pellets	15.3	16.7	10.0%
Biodiesel	37.2	38.7	4.0%
Bioethanol	26.8	29.7	10.0%
Petroleum:			
Crude oil (weighted average)	43.4	45.7	
Petroleum products (weighted average)	44.1	46.4	
Ethane	46.6	50.7	
Butane and propane (LPG)	46.0	49.3	
Light distillate feedstock for gasworks	45.4	47.8	
Aviation spirit and wide cut gasoline	45.0	47.4	
Aviation turbine fuel	43.9	46.2	
Motor spirit	44.8	47.1	
Burning oil	43.9	46.2	
Gas/diesel oil	42.6	45.3	
DERV	42.9	45.7	
Fuel oil	40.7	43.3	
Power station oil	40.7	43.3	
Non-fuel products (notional value)	40.9	43.1	

	MJ per cubic metre net	MJ per cubic metre gross
Natural gas produced *(8)*	35.7	39.7
Natural gas consumed *(9)*	35.4	39.3
Coke oven gas	16.2	18.0
Blast furnace gas	3.0	3.0
Landfill gas *(10)*	19-23	21-25
Sewage gas *(10)*	19-23	21-25

(1) Applicable to UK consumption - based on calorific value for home produced coal plus imports and, for "All consumers" net of exports.

(2) Home produced plus imports

(3) On an "as received" basis; seasoned logs at 20% moisture content. On a "dry" basis 18.6 GJ per tonne.

(4) Data reported on an oven dry basis of 18.6 GJ per tonne.

(5) The calorific value of poultry litter typically ranges on a net basis from 5 GJ/tonne to 10 GJ/tonne depending upon the moisture content of the fuel. For poultry manure, much lower calorific values should be used.

(6) Average figure based on survey returns.

(7) On an "as received" basis; at 30% moisture content. On a "dry" basis 18.6 GJ per tonne.

(8) The gross calorific value of natural gas can also be expressed as 11.024 kWh per cubic metre. This value represents the average calorific value seen for gas when extracted. At this point it contains not just methane, but also some other hydrocarbon gases (ethane, butane, propane). These gases are removed before the gas enters the National Transmission System for sale to final consumers.

(9) UK produced and imported gas. This weighted average of calorific values will approximate the average for the year of gas entering the National Transmission System. It can also be expressed as 10.913 kWh per cubic metre.

(10) Calorific value varies depending on the methane content of the gas.

Note: The above estimated average calorific values apply only to the year 2013. For calorific values of fuels in earlier years see Tables A.2 and A.3 and previous issues of this Digest. See the notes in Chapter 1, paragraph 1.54 regarding net calorific values. The calorific values for coal other than imported coal are based on estimates provided by the main coal producers, but with some exceptions as noted on Table A.2. The calorific values for petroleum products have been calculated using the method described in Chapter 1, paragraph 1.31. Data reported in this Digest in 'thousand tonnes of oil equivalent' have been prepared on the basis of 1 tonne of oil equivalent having an energy content of 41.868 gigajoules (GJ), (1 GJ = 9.478 therms) - see notes in Chapter 1, paragraphs 1.28 to 1.29.

A.2 Estimated average gross calorific values of fuels 1980, 1990, 2000 and 2010 to 2013

GJ per tonne (gross)

	1980	1990	2000	2010	2011	2012	2013
Coal							
All consumers *(1)(2)*	25.6	25.5	26.2	25.8	25.9	26.0	26.0
All consumers - home produced plus imports minus exports *(1)*	..	..	27.0	27.1	26.9	26.9	27.0
Power stations *(2)*	23.8	24.8	25.6	24.9	25.2	25.3	25.2
Power stations - home produced plus imports *(1)*	..	..	26.0	25.8	26.0	26.2	26.3
Coke ovens *(2)*	30.5	30.2	31.2	30.5	32.0	31.8	31.8
Coke ovens - home produced plus imports *(1)*	..	..	30.4	30.5	32.0	31.8	31.8
Low temperature carbonisation plants and manufactured fuel plants	19.1	29.2	30.3	30.2	28.4	28.4	28.5
Collieries	27.0	28.6	29.6	29.3	29.0	29.0	29.0
Agriculture	30.1	28.9	29.2	28.0	29.5	29.5	29.5
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	27.7	26.8	26.8	26.8
Non-ferrous metals	..	23.1	25.1	25.4	25.1	25.1	25.1
Food, beverages and tobacco	28.6	28.1	29.5	28.6	29.5	29.4	29.4
Chemicals	25.8	27.3	28.7	26.7	26.7	26.6	26.5
Textiles, clothing, leather and footwear	27.5	27.7	30.4	29.5	29.5	29.5	29.5
Pulp, paper, printing, etc.	26.5	27.9	28.7	24.1	24.2	24.2	24.2
Mineral products *(4)*	..	28.2	27.0	27.6	27.6	27.7	27.8
Engineering *(5)*	27.7	28.3	29.3	29.5	29.5	29.5	29.5
Other industry *(6)*	28.4	28.5	30.2	32.6	32.6	32.5	32.6
Domestic							
House coal	30.1	30.2	30.9	29.8	30.2	30.2	30.2
Anthracite and dry steam coal	33.3	33.6	33.5	34.7	34.6	34.5	34.3
Other consumers	27.5	27.5	29.2	25.5	26.4	26.3	26.3
Transport - Rail	..	..	..	30.3	30.3	30.2	30.2
Imported coal *(1)*	..	28.3	28.0	27.9	27.5	27.4	27.4
of which Steam coal	..	..	26.6	25.8r	26.5	26.5	26.5
Coking coal	..	..	30.4	30.5r	32.0	31.8	31.8
Anthracite	..	..	31.2	31.0	31.2	31.7	31.7
Exports *(1)*	..	29.0	32.0	32.3	32.3	32.4	32.3
of which Steam coal	..	..	31.0	31.2	31.2	31.2	31.2
Anthracite	..	..	32.6	33.2	32.7	32.7	32.6
Coke *(7)*	28.1	28.1	29.8	29.8	29.8	29.8	29.8
Coke breeze	24.4	24.8	24.8	29.8	29.8	29.8	29.8
Other manufactured solid fuels *(1)*	27.6	27.6	30.8	29.8r	29.8r	29.8r	29.8
Petroleum							
Crude oil *(1)*	45.2	45.6	45.7	45.7	45.7	45.7	45.7
Liquified petroleum gas	49.6	49.3	49.1	49.2	49.3	49.3	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	47.6	47.8	47.7	47.8	47.8
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	47.1	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 (8)	45.5	45.4	45.6	45.3	45.3	45.3	45.3
DERV (8)	..	..	..	45.6	45.7	45.7	45.7
Fuel oil	42.8	43.2	43.1	43.3	43.3	43.3	43.3
Power station oil	42.8	43.2	43.1	43.3	43.3	43.3	43.3
Non-fuel products (notional value)	42.2	43.2	43.8	43.1	43.1	43.1	43.1
Petroleum coke (Power stations)	..	..	..	30.9	30.3	31.1	30.1
Petroleum coke (Other)	..	39.5	35.8	35.8	35.8	35.8	35.8
Natural Gas *(9)*	..	38.4	39.4	40.1	39.8	39.6	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) DERV included within gas/diesel oil until 2005.

(9) Natural Gas figures are shown in MJ per cubic metre.

A.3 Estimated average net calorific values of fuels 1980, 1990, 2000 and 2010 to 2013

GJ per tonne (net)

	1980	1990	2000	2010	2011	2012	2013
Coal							
All consumers *(1)(2)*	24.3	24.2	24.9	24.5	24.6	24.7	24.7
All consumers - home produced plus imports minus exports *(1)*	..	..	25.6	25.7	25.6	25.5	25.7
Power stations *(2)*	22.6	23.6	24.3	23.6	24.0	24.1	24.0
Power stations - home produced plus imports *(1)*	..	..	24.7	24.5	24.7	24.9	25.0
Coke ovens *(2)*	29.0	28.7	29.6	29.0	30.4	30.2	30.2
Coke ovens - home produced plus imports *(1)*	..	..	28.9	29.0	30.4	30.2	30.2
Low temperature carbonisation plants and manufactured fuel plants	18.1	27.7	28.8	28.7	27.0	27.0	27.0
Collieries	25.7	27.2	28.1	27.9	27.5	27.5	27.5
Agriculture	28.6	27.5	27.8	26.6	28.0	28.1	28.1
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	26.3	25.5	25.5	25.5
Non-ferrous metals	..	21.9	23.8	24.1	23.8	23.8	23.8
Food, beverages and tobacco	27.2	26.7	28.0	27.2	28.0	27.9	27.9
Chemicals	24.5	25.9	27.2	25.4	25.4	25.3	25.2
Textiles, clothing, leather and footwear	26.1	26.3	28.9	28.0	28.0	28.1	28.1
Pulp, paper, printing, etc.	25.2	26.5	27.3	22.9	23.0	23.0	23.0
Mineral products *(4)*	..	26.8	25.7	26.3	26.3	26.3	26.4
Engineering *(5)*	26.3	26.9	27.8	28.0	28.0	28.0	28.0
Other industry *(6)*	27.0	27.1	28.7	31.0	31.0	30.9	31.0
Domestic							
House coal	28.6	28.7	29.4	28.3	28.7	28.7	28.7
Anthracite and dry steam coal	31.6	31.9	31.9	32.9	32.9	32.8	32.6
Other consumers	26.1	26.1	27.7	24.3	25.1	25.0	25.0
Transport - Rail	..	..	..	28.8	28.8	28.7	28.7
Imported coal *(1)*	..	26.9	26.6	26.5	26.1	26.1	26.0
of which Steam coal	..	..	25.3	24.5r	25.2	25.2	25.2
Coking coal	..	..	28.9	29.0r	30.4	30.2	30.2
Anthracite	..	..	29.6	29.5	29.7	30.1	30.1
Exports *(1)*	..	27.6	30.4	30.7	30.7	30.8	30.7
of which Steam coal	..	..	29.4	29.6	29.6	29.6	29.6
Anthracite	..	..	30.9	31.6	31.1	31.1	31.0
Coke *(7)*	28.1	28.1	29.8	29.8	29.8	29.8	29.8
Coke breeze	24.4	24.8	24.8	29.8	29.8	29.8	29.8
Other manufactured solid fuels *(1)*	26.2	26.2	29.3	28.3r	28.3r	28.3r	28.3
Petroleum							
Crude oil *(1)*	42.9	43.3	43.4	43.4	43.4	43.4	43.4
Liquified petroleum gas	46.2	46.0	46.0	46.0	46.0	46.0	46.0
Ethane	48.1	46.6	46.6	46.6	46.6	46.6	46.6
LDF for gasworks/Naphtha	45.4	45.5	45.3	45.4	45.3	45.4	45.4
Aviation spirit and wide-cut gasoline (AVGAS and AVTAG)	44.8	44.9	44.9	45.0	45.1	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	44.8	44.8
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 (8)	42.8	42.7	42.9	42.6	42.6	42.6	42.6
DERV (8)	..	..	..	42.9	42.9	42.9	42.9
Fuel oil	40.2	40.6	40.5	40.7	40.7	40.7	40.7
Power station oil	40.2	40.6	40.5	40.7	40.7	40.7	40.7
Non-fuel products (notional value)	40.1	41.0	41.6	40.9	40.9	40.9	40.9
Petroleum coke (Power stations)	..	..	..	29.3	28.8	29.6	28.6
Petroleum coke (Other)	..	37.5	34.0	34.0	34.0	34.0	34.0
Natural Gas *(9)*	..	34.6	35.5	36.1	35.8	35.6	35.7

For footnotes see table A.2
The net calorific value of natural gas is the gross calorific value x 0.9.

Annex B
Glossary and Acronyms

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.
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).
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 constituent of motor fuel.
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 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.
Bioenergy	Bioenergy is renewable energy made from material of recent biological origin derived from plant or animal matter, known as biomass.
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.
Biomass	Renewable organic materials, such as wood, agricultural crops or wastes, and municipal wastes. Biomass can be burned directly or processed into biofuels such as ethanol and methane
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 (¾ 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_4H_{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) derived unit of energy and heat is the Joule. This is the energy in a given quantity 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.

Carbon Emission Reduction Target (CERT) The Carbon Emissions Reduction Target (CERT) follows on from the Energy Efficiency Commitment (EEC). CERT requires gas and electricity suppliers to achieve targets for a reduction in carbon emissions generated by the domestic sector.

CCA Climate Change Agreement. Climate Change Agreements allow energy intensive business users to receive a 65 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.

CO_2	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 in 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 qualities 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 existing and abandoned deep mines and from coal beds 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.
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 chains or combining shorter carbon chain components of crude oil or other refinery feedstocks. 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 CRC Energy Efficiency scheme is a mandatory scheme aimed at improving energy efficiency and cutting emissions in large public and private sector organistaions.
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.
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.
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.
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.
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 burning generators. The category also includes some domestic generators such as those with electric solar panels.
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.

ESA European System of Accounts. An integrated system of economic accounts which is the European version of the System of National Accounts (SNA).

Ethane A light hydrocarbon gas (C_2H_6) in natural gas and refinery gas streams (see LPG).

EU-ETS European Union Emissions Trading Scheme. This began on 1st January 2005 and involves the trading of emissions allowances as means of reducing emissions by a fixed amount.

EUROSTAT Statistical Office of the European Commission.

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.

Feed-In Tariffs The Feed-in Tariffs (FITs) scheme was introduced on 1 April 2010 to encourage deployment of small-scale (less than 5MW) low-carbon electricity generation. People with a qualifying technology receive a guaranteed payment from an electricity supplier of their choice for the electricity they generate and use, as well as a guaranteed payment for unused surplus electricity they export back to the grid.

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.

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 operation, 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 old definition of a fuel poor household was one needing to spend in excess of 10 per cent of household income to achieve a satisfactory heating regime (21ºC in the living room and 18ºC in the other occupied rooms). The new definition, adopted under the under the Low Income

	High Costs (LIHC) framework, is that a household is said to be in fuel poverty if they have required fuel costs that are above average (the national median level), and were they to spend that amount they would be left with a residual income below the official poverty line
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.
Gigawatt (GW)	A unit of electrical power, equal to 10^9 watts.
Green Deal	A scheme by which energy-saving improvements can be made to a home or business without having to pay all the costs up front; energy-saving improvements include: • insulation - eg loft or cavity wall insulation • heating • draught-proofing • double glazing • renewable energy technologies - eg solar panels or wind turbines
Heat pumps	Heat pumps use a heat exchanger (much like that installed in fridges and freezers – although running in reverse) to take heat from the ground or air and convert it into heating in the home (either radiators, underfloor heating or warm air heating systems and hot water). Ground source heat pumps use pipes which are buried in the ground to extract heat. Air source heat pumps absorb heat from the outside air. Heat pumps need electricity to run, but the heat they extract from the ground or air is constantly being renewed naturally.
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	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.
Indigenous production	The extraction or capture of primary fuels: for oil this includes production from the UK Continental Shelf, both onshore and offshore.
Industrial spirit	Refined petroleum fractions with boiling ranges up to 200ºC dependent on the use to which they are put – e.g. seed extraction, rubber solvents, perfume etc.

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.
ISSB	International Steel Statistics Bureau
Joules	A joule is a generic unit of energy in the conventional SI system. 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.
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.
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
Naphtha	(Light distillate feedstock) – Petroleum distillate boiling predominantly below 200°C.

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 allocated, effectively stating how much that sector can emit over the trading period of the scheme.
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 components are methane, ethane, propane and 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.
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
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.
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.
NUTS	Nonmenclature of Units for Territorial Statistics
OFGEM	The regulatory office for gas and electricity markets
OFT	Office of Fair Trading
ONS	Office for National Statistics

Orimulsion	An emulsion of bitumen in water that was used as a fuel in some power stations until 1997.
OTS	Overseas Trade Statistics of the United Kingdom
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.
Photovoltaics	The direct conversion of solar radiation into electricity by the interaction of light with the electrons in a semiconductor device or cell.
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.
Plant capacity	The maximum power available from a power station at a point in time.
Plant loads, demands and efficiency	Measures of how intensively and efficiently power stations are being used.
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 DECC energy statistics website for further information).
Primary electricity	Electricity obtained other than from fossil fuel sources, e.g. nuclear, hydro and other non-thermal renewables. Imports of electricity are also included.
Primary fuels	Fuels obtained directly from natural sources, e.g. coal, oil and natural gas.
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.
Propane	Hydrocarbon containing three carbon atoms (C_3H_8), gaseous at normal temperature, but generally stored and transported under pressure as a liquid.
RD	Renewables Directive – this proposes that EU Member States adopt national targets that are consistent with the overall EU target of 20 per cent of energy from renewables by 2020.

Refinery fuel	Petroleum products produced by the refining process that are used as fuel at refineries.
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.
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.
RESTATS	The Renewable Energy Statistics database for the UK.
Ricardo-AEA	Formerly known as AEA Energy & Environment.
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
Seasonal Performance Factor	The Seasonal Performance Factor (SPF) of a heat pump is the total useful heat delivered during a year divided by the annual electricity consumption of the pump. The SPF gives an indication of the efficiency of the pump, with values greater than 1 implying that more useful heat is produced than the electricity used to power the pump.
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.
SI (Système International)	Refers to the agreed conventions for the measurement of physical quantities**.**

SIC	The United Kingdom Standard Industrial Classification of Economic Activities (SIC) is used to classify business establishments and other standard units by the type of economic activity in which they are engaged. It provides a framework for the collection, tabulation, presentation and analysis of data and its use promotes uniformity. In addition, it can be used for administrative purposes and by non-government bodies as a convenient way of classifying industrial activities into a common structure. The system is identical to the EUROSTAT System NACE at the four digit class level and the United Nations system ISIC at the two digit Divisional level.
SO_2	Sulphur Dioxide. Sulphur dioxide is a gas produced by the combustion of sulphur-containing fuels such as coal and oil.
SRO	Scottish Renewable Orders
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.
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.
Tars	Viscous materials usually derived from the destructive distillation of coal which are by-products of the coke and iron making processes.
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 1971 to 2000.
Terawatt (TW)	1,000 gigawatts
Therm	A common unit of measurement similar to a tonne of oil equivalent which enables different fuels to be compared and aggregated.
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.
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
TWh	Terawatt hour
UKCS	United Kingdom Continental Shelf

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, and initially enjoyed a lower rate of hydrocarbon oil duty in the UK than ordinary diesel to promote its use, although duty rates on standard diesel and ULSD have since been equalised. 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). ULSP initially enjoyed a lower rate of hydrocarbon oil duty in the UK than ordinary petrol to promote its use, although duty rates on standard petrol and ULSP have since been equalised. 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.
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 150ºC to 200ºC 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
Phone: 0845 504 9188
Email: deccteam@decc.ecgroup.net

and can also be found on the DECC section of the gov.uk website at:
www.gov.uk/government/organisations/department-of-energy-climate-change

Department of Energy and Climate Change publications on energy statistics

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.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics

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 SSD/Finance, 2nd Floor, Foss House, 1-2 Peasholme Green, York YO1 7PX, Tel. 01904 455395. A subscription form is available from DECC, Tel 0300 068 5041. Single copies are available from the Publications Orderline priced at £6. An electronic version of previous editions can be found at: www.gov.uk/government/collections/energy-trends.

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).
Single copies are available from the Publications Orderline priced at £8. An electronic version of previous editions can be found at: www.gov.uk/government/collections/quarterly-energy-prices.

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 2014 edition of the chart shows the flows for 2013. Available free from DECC, Tel 0300 068 5056 and from the Publications Orderline. It is also available on the Internet at: www.gov.uk/government/collections/energy-flow-charts.

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, Tel 0300 068 5056 and from the Publications Orderline. It is also available on the Internet at:
www.gov.uk/government/collections/uk-energy-in-brief

UK Energy Sector Indicators

An annual publication designed to show the extent to which secure, diverse and sustainable supplies of energy to UK businesses and consumers, at competitive prices, are ensured. It is available on the Internet at: www.gov.uk/government/collections/uk-energy-sector-indicators

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 and changes in efficiency, intensity and output since the 1970s, 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 is available on the Internet at:
www.gov.uk/government/collections/energy-consumption-in-the-uk

Sub-National Energy Consumption statistics

Sub-National data are produced by DECC to emphasise the importance of local and regional decision making for energy policy in delivering a number of national energy policy objectives. Data can be accessed on the Internet at:
www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics

National Energy Efficiency Data-framework (NEED)

DECC has constructed a National Energy Efficiency Data-framework (NEED) to enable detailed statistical analysis of energy efficiency. The data framework matches the gas and electricity consumption data collected for DECC sub-national energy consumption statistics and records of energy efficiency measures in the Homes Energy Efficiency Database (HEED) run by the Energy Saving Trust (EST), as well as typographic data about dwellings and households. Data can be accessed on the Internet at:
www.gov.uk/government/collections/national-energy-efficiency-data-need-framework

Annual report on Fuel Poverty statistics

A report, published separately from the UK Fuel Poverty Strategy, detailing the latest statistics on fuel poverty. It is available on the Internet at: www.gov.uk/government/collections/fuel-poverty-statistics

Green Deal and Energy Company Obligation Statistics

DECC publishes a range of information relating to the rollout of the Green Deal and ECO policy. This includes number of GD Assessments, number of GD Plans, number of energy efficiency measures installed, data on the amount of GD cashback vouchers issued, data on ECO brokerage, and information on the supply chain. DECC also publishes quarterly statistics on the levels of wall and loft insulation in Great Britain, along with information on the remaining potential for insulation measures. Data can be accessed on the Internet at:
www.gov.uk/government/collections/green-deal-and-energy-company-obligation-eco-statistics

UK Greenhouse Gas Emissions statistics

Emissions data are produced by DECC to show progress against the UK's goals, both international and domestic, for reducing greenhouse gas emissions. Data can be accessed on the Internet at:
www.gov.uk/government/collections/uk-greenhouse-gas-emissions

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.gov.uk/government/collections/energy-and-emissions-projections

Department of Energy and Climate Change policy publications

Energy Act 2013
The Energy Act 2013 was given Royal Assent on 18 December 2013. The Act is available on the Internet at: www.legislation.gov.uk/ukpga/2013/32/contents

Annual Energy Statement
In the Coalition Programme for Government, the Government committed to producing an Annual Energy Statement (AES) to provide market direction, set strategic energy policy and help guide investment. The first statement was delivered to Parliament on 27 June 2010, with subsequent statements delivered on 23 November 2011 and 29 November 2012. The latest Statement, delivered on 31 October 2013, is available on the Internet at: www.gov.uk/government/publications/annual-energy-statement-2013

Energy Act 2011
The Energy Act 2011 was given Royal Assent on 18 October 2011. The Act is available on the Internet at: www.legislation.gov.uk/ukpga/2011/16/contents

Electricity Market Reform (EMR) White Paper
On 12 July 2011 the Government published 'Planning our electric future: a White Paper for secure, affordable and low-carbon electricity'. The White Paper sets out key measures to attract investment, reduce the impact on consumer bills, and create a secure mix of electricity sources including gas, new nuclear, renewables, and carbon capture and storage. The White Paper is available on the Internet at: www.gov.uk/government/publications/planning-our-electric-future-a-white-paper-for-secure-affordable-and-low-carbon-energy

Energy Act 2010
The Energy Act 2010 was given Royal Assent on 8 April 2010. The Act is available on the Internet at: www.legislation.gov.uk/ukpga/2010/27/contents

UK Low Carbon Transition Plan
The UK Low Carbon Transition Plan was published on 15 July 2009. The Plan is available on the Internet at:
www.gov.uk/government/publications/the-uk-low-carbon-transition-plan-national-strategy-for-climate-and-energy

Energy Act 2008
The Energy Act 2008 was granted Royal Assent on 26 November 2008. The Act is available on the Internet at: www.legislation.gov.uk/ukpga/2008/32/contents

Climate Change Act 2008
The Climate Change Act 2008 was granted Royal Assent on 26 November 2008. The Act is available on the Internet at: www.legislation.gov.uk/ukpga/2008/27/contents

Other publications including energy information

General

Eurostat Yearbook (annual); *Statistical Office of the European Commission - Eurostat*
Eurostatistics (monthly); *Statistical Office of the European Commission – Eurostat*
Index of production (monthly); *Office for National Statistics*
Overseas Trade Statistics (OTS) of the United Kingdom; *H.M. Revenue and Customs*
- OTS trade with EU countries (monthly)
- OTS trade with non EU countries (monthly)

Regional Yearbook (annual); *Statistical Office of the European Commission – Eurostat*
United Kingdom Minerals Yearbook; *British Geological Survey*

Energy

BP Statistical Review of World Energy (annual); *BP*
Energy - Yearly Statistics; *Statistical Office of the European Commission – Eurostat*
Energy Balance Sheets; *Statistical Office of the European Commission – 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 Statistics Yearbook (annual); *United Nations Statistical Office*
World Energy Statistics; *International Energy Agency*

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 – Ten Year Statement - (annual); *National Grid*

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*
Petroleum Review (monthly); *Energy Institute*

Prices

Energy Prices and Taxes (quarterly); *International Energy Agency*

Renewables

Renewables Information (annual); *International Energy Agency*

Useful energy related websites

The DECC section of the gov.uk website can be found at: www.gov.uk/government/organisations/department-of-energy-climate-change, the energy information and statistics section is at: www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics

Other Government web sites

Department for Communities and Local Government.	www.gov.uk/government/organisations/department-for-communities-and-local-government
Department for Environment, Food and Rural Affairs	www.gov.uk/government/organisations/department-for-environment-food-rural-affairs
Department for Transport	www.gov.uk/government/organisations/department-for-transport
HM Government Online	www.gov.uk/
HM Revenue & Customs	www.gov.uk/government/organisations/hm-revenue-customs
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 Government	http://wales.gov.uk/

Other useful energy related web sites

BP	www.bp.com/
British Geological Survey	www.bgs.ac.uk/
BRE (Building Research Establishment)	www.bre.co.uk/
The Coal Authority	http://coal.decc.gov.uk/
Energy Institute	www.energyinst.org/home
Energy Networks Association	www.energynetworks.org/
Energy UK	www.energy-uk.org.uk/
Europa (European Union Online)	http://europa.eu/
Eurostat	http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/
Interconnector	www.interconnector.com/
International Energy Agency (IEA)	www.iea.org/
International Steel Statistics Bureau (ISSB)	www.issb.co.uk/
National Grid	www2.nationalgrid.com/corporate/
Oil & Gas UK	www.oilandgasuk.co.uk/
Renewable UK	www.renewableuk.com/
Ricardo - AEA	www.ricardo-aea.com/cms/
The Stationery Office	www.tso.co.uk/
UK-AIR: Air Information Resource	http://uk-air.defra.gov.uk/
UK Petroleum Industry Association	www.ukpia.com/home.aspx
United Nations Statistics Division	http://unstats.un.org/unsd/default.htm
US Department of Energy	http://energy.gov/
US Energy Information Administration	www.eia.gov/

Annex D

Major events in the Energy Industry

2014

Carbon Capture and Storage (CCS)

In February 2014 the Government agreed a multi-million pound contract for engineering, design and financial work on the Peterhead CCS project in Aberdeenshire with Shell, to take their gas carbon capture and storage (CCS) project into the next stage of development. The world's first planned gas CCS project, Peterhead involves installing carbon capture technology onto SSE's existing Peterhead gas power plant, and transporting the CO2 100km offshore for safe, permanent storage 2km under the North Sea in the old Goldeneye gas field. If built, the project could save 1 million tonnes CO2 each year and provide clean electricity to over 500,000 homes.

Electricity

The Government gave consent to the Rampion offshore wind farm off the coast of Sussex in July 2014. Once built it is expected to generate enough electricity to power approximately 450,000 homes.

The Government gave consent to the East Anglia One offshore wind farm in June 2014. Once built it is expected to generate enough electricity to power approximately 820,000 homes.

In April 2014 the Government announced that eight renewable electricity projects were offered under the Final Investment Decision Enabling Programme (launched in advance of the Contracts for Difference (CfD) regime being put in place, which forms part of the Electricity Market Reform programme). They include offshore wind farms, coal to biomass conversions and a dedicated biomass plant with combined heat and power, which could add a further 4.5GW of low-carbon electricity to Britain's energy mix (or around 4% of capacity), generating enough clean electricity to power over three million homes.

Energy Efficiency

The Green Deal Home Improvement Fund (GDHIF) was launched in May 2014 with up to £120m available in 2014-15. The GDHIF is a new, innovative home improvement scheme open for all householders from early June. The scheme means householders could get up to £7,600 back on incentives covering a range of 13 energy efficiency improvements, including solid wall insulation, new heating systems and glazing."

The Government announced proposals for a set of changes to ECO in December 2013. These include: extending through to 2017, with new targets; reducing the ambition of the Carbon Saving Target element; and allowing new measures (loft and standard cavity wall insulation, and district heating) to be eligible under that element. The Government published a consultation on these proposals in March 2014, and intends subject to consultation that revised regulations will come into force later in 2014, but with many changes taking effect as from 1 April 2014.

2014 (continued)

Energy Policy

In March 2014 a range of energy policy measures were announced in the Budget, these include:

- Carbon Price Floor (CPF) - capping the Carbon Price Support (a tax on fossil fuels used to generate electricity) at £18.00 from 2016–17 to 2019–20;

- Energy intensive industries – these industries will continue to be compensated for the costs of the EU Emissions Trading Scheme (ETS) and Carbon Price Floor (CPF) until 2019–20. There will be a new compensation scheme for the price of the Renewables Obligation and small scale feed-in-tariffs from 2016–17.

- CHP - the Government is exempting fuel used to generate good quality electricity by Combined Heat and Power plants from the Carbon Price Floor (CPF), where that electricity is used onsite.

- Competition and small businesses - reaffirming the Government's commitment to make energy markets more competitive for small and very small businesses.

- Oil & Gas industry - investment to the tune of £1.9 million for 2014–15 and £5 million for 2015–16 to fund the establishment of a new body to take stewardship of the UK's oil and gas resources; introducing a new tax allowance to encourage offshore operators to invest further in new and existing ultra-high-pressure, high-temperature fields in the North Sea, and bringing forward a new tax allowance which will encourage further exploration of promising onshore shale gas resources.

- Carbon Capture and Storage innovation - the Government is providing £60m for low carbon energy innovation to Carbon Capture and Storage (CCS) technologies that have significant potential to reduce the cost of low carbon generation to the UK.

Oil and Gas

As part of the Budget announcement in March 2014, details of how the Capacity Market is being designed ahead of the first auction being held in December 2014 were published. The Capacity Market will help drive new investment in gas demand side capacity, and get the best out of the existing generation fleet as the UK moves to a low carbon electricity future. The Capacity Market is designed to ensure:

- 15 year capacity agreements will be available to new capacity providers;

- Existing capacity will be able to access rolling one year agreements;

- Penalties for unreliable capacity will be capped;

- The capacity auction's prices will be capped to protect consumers.

2014 (continued)

Sir Ian Wood's review into maximising North Sea oil and gas reserves was published in February 2014. The Review announced:

- a joint commitment between government and the industry to ensure production licences are awarded on the basis of recovering the maximum amount of petroleum from UK waters as a whole;
- greater collaboration between industry and government;
- a new independent regulator to supervise licensing and ensure maximum collaboration between companies to explore, develop and produce oil and gas.

Renewable Heat

In April 2014 the Government launched the domestic Renewable Heat Incentive to encourage a switch to renewable heating system in the domestic sector. This financial incentive scheme is open to homeowners, private landlords, social landlords and self-builders and is targeted at, but not limited to, homes off the gas grid. The scheme supports air to water heat pumps; biomass only boilers and biomass pellet stoves with integrated boilers; ground to water and water to water source heat pumps; flat plate and evacuated tube solar thermal panels.

Renewables

In March 2014, Siemens announced its decision to invest £160 million in wind turbine production and installation facilities in Yorkshire creating more than 1,000 new jobs in the Hull area. The plan will be spread across two sites comprising:

- the Green Port Hull project construction, assembly and service facility, and
- a new rotor blade manufacturing facility in East Riding.

2013

Carbon Capture and Storage (CCS)

In December 2013 the Government announced its intention to award a contract for detailed design and planning, known as a FEED study to the White Rose CCS project, based at the Drax site. The White Rose proposal is to build a new state-of-the-art 426 MWe (gross) clean coal power plant with full carbon capture and storage, bringing clean electricity to over 630,000 homes and capturing approximately 2 million tonnes of CO2 per year.

Coal

In March 2013 the Daw Mill Colliery in Warwickshire closed following a major fire. The fire, the largest seen in a UK coal mine in over 30 years, brought an end to 47 years of coal production at Daw Mill.

Electricity

In July 2013 National Grid announced that T-pylon, the winner of the Pylon Design Competition, is being offered for the first time in the UK for a new electricity connection in Somerset. The Hinkley Point connection which runs between Bridgwater and Avonmouth is needed to carry all the new electricity generation planned for the South West.

The Government gave consent to Galloper Wind Farm Limited in May 2013 to construct a 504MW wind farm off the coast of Suffolk and related infrastructure at Sizewell which will connect the wind farm to the electricity grid system. The 140 turbine development is expected to provide enough electricity to power the equivalent of as many as 500,000 homes a year when completed in 2017.

The Government gave consent to Ecotricity in February 2013, to construct a 66MW wind farm in East Heckington, Lincolnshire. It is estimated that the turbines will provide enough electricity to power the equivalent of as many as 39,700 homes a year.

Energy Efficiency

The Green Deal scheme, the Coalition Government's new initiative to transform Britain's homes, was launched in January 2013, giving people the opportunity to transform their homes by paying for energy efficient home improvements with the savings on their energy bills.

At the same time the Energy Company Obligation (ECO) came into force, working alongside the Green Deal, with the aims of saving carbon by supporting energy efficiency measures in harder to treat homes and enabling the installation of efficient boilers and insulation into the homes of vulnerable people across Great Britain.

2013 (continued)

Energy Policy

The Energy Bill completed its passage through both Houses of Parliament and was granted Royal Assent in December 2013. The Energy Act 2013 will now establish the legislative framework for delivering secure, affordable and low carbon energy. The Act includes provisions on:

- Electricity Market Reform (EMR) - the Act puts in place key measures to attract £110 billion investment needed to replace current generating capacity and to upgrade the grid by 2020, and to cope with the UK's rising demand for electricity;

- Decarbonisation – the Government will set a 2030 decarbonisation target range for the electricity sector in secondary legislation;

- Protecting consumers - the Act includes provisions on setting a limit on the number of energy tariffs offered to domestic consumers; requiring the automatic move of customers from poor value closed tariffs to cheaper deals, and requiring suppliers to provide information to consumers on the best alternative deals available.

In December 2013 the Government announced a series of proposals to reduce the impact of energy company price rises which should make British households on average £50 better off. These include:

- No reduction in help currently available to vulnerable households;

- Safeguarding green jobs;

- For people moving home there will be help in installing energy saving measures in order to cut their bills through improved energy efficiency.

In October 2013 the Government published its Annual Energy Statement, alongside the Statutory Security of Supply Report. The statement detailed a number of new important measures aimed at giving consumers more control including:

- Energy companies must make switching suppliers faster for consumers;

- Energy companies will be required to include a QR (Quick Response) code on energy bills;

- Energy companies should be more open about how they treat credit balances in consumers' accounts, making every effort to return money to customers with closed accounts;

- Ofgem will carry out a market assessment every year, working with the Office of Fair Trading and the new Competition and Market Authority to monitor market participants and ensure the market is working for residential and small business consumers and that all suppliers can compete fairly;

- Ofgem will also carry out a detailed assessment of energy suppliers' financial reporting practices and set out necessary steps to improve transparency – so consumers can see where their money is going.

2013 (continued)

In June 2013 the Government announced details of vital reforms for keeping the lights on and emissions and bills down. These reforms also highlighted the potential scale of investment, growth and job opportunities available in the energy economy. The reforms include:

- Government action to unlock up to £110 billion energy infrastructure investment and support up to 250,000 jobs by 2020;
- Capacity Market to be initiated in 2014 to bring on gas and other flexible electricity supply to meet future demand and reduce risks to security of supply from winter 2018;
- Renewable Strike Prices to help renewables contribute more than 30 per cent of total power by 2020.

In April 2013, the carbon price floor - a tax on carbon - came into effect. As part of the scheme, changes were made to the Climate Change Levy (CCL), setting up new carbon price support (CPS) rates of CCL for gas, solid fuels and liquefied petroleum gas (LPG) used in electricity generation.

In March 2013 Ofgem published the final domestic proposals from its Retail Market Review (RMR), proposing a new set of rules for the retail market to allow consumers to make better choices about their gas and electricity supply. The proposals from this review included reducing complexity for consumers when choosing tariffs, and arming consumers with more useful information when choosing their gas or electricity supplier.

In March 2013 the Government published 'The Future of Heating: Meeting the Challenge' setting out an action plan to ensure affordable, secure, low carbon heating plays an important role in the nation's energy mix. The action plan looks at the potential to cut emissions from heat across the whole UK economy and focuses on a number of key actions to spur on the move to low carbon heating alternatives and drive forward green growth.

In January 2013, the Office of Fair Trading reported that on the basis of evidence gathered, that competition is working well in the UK road fuel sector, although it identified an absence of pricing information on motorways as a concern. In response to the report, the Government announced in March 2013 that it would work with motorway service stations and other relevant bodies to improve the availability and visibility of motorway fuel price information for motorway users.

The Government tabled new clauses to the Energy Bill in February 2013, to ensure that consumers get a better deal on their energy bills, and to press ahead with decarbonising the power sector by 2030. The complexity and number of energy tariffs available for consumers will be reduced, and bills simplified, to deliver on the Prime Minister's commitment to help consumers get the cheapest tariff available. Clauses were also tabled to grant Government powers to set a 2030 decarbonisation target range for the electricity sector in 2016, once the Committee on Climate Change has provided advice on the level of the 5th carbon budget, and when the level of this carbon budget is set in law.

2013 (continued)

Fuel Poverty

Through the Energy Act 2013, the Government has laid the ground for a new legal framework to monitor fuel poverty in England using the Low Income High Costs Indicator (LIHC). This new measure of fuel poverty was first proposed in Professor Hills' review of Fuel Poverty and following consultation, the Government confirmed its intention to adopt the indicator in July 2013. In the strategic framework document, 'Fuel Poverty: a framework for future action' the Government set out how the new indicator will inform the strategic approach to tackling fuel poverty, including setting a new fuel poverty target which will be underpinned by a new fuel poverty strategy.

Nuclear

Planning consent was given by the Government in March 2013 for construction of the first new nuclear power station in the UK since 1995. The station at Hinkley Point, Somerset – to be operated by NNB Generation - will generate enough low carbon electricity to power the equivalent of five million households, making it one of the largest power stations in the UK.

Oil and Gas

In October 2013 the Government worked closely with the management, union, key stakeholders and the Scottish Government to help resolve the industrial dispute at Grangemouth oil refinery, ensuring that 800 jobs were saved. The Grangemouth complex, Scotland's largest industrial site, produces petrochemicals and supplies fuels primarily to customers in Scotland, northern England and Northern Ireland.

In May 2013, officials from the European Commission carried out unannounced inspections at the premises of several companies active in the crude oil, refined oil products and biofuels sectors. The Commission had concerns that the companies may have colluded in reporting distorted prices to a Price Reporting Agency to manipulate the published prices for a number of oil and biofuel products.

The Government gave consent to Statoil in February 2013, to drill the Mariner heavy oil field. At its peak the field is expected to produce around 55,000 barrels of oil per day, five per cent of UK daily production.

Renewables

In December 2013 the Drax coal-to-biomass conversion plant in North Yorkshire was officially opened. The plant will burn wood pellets rather than coal, which will reduce carbon emissions by 80 compared to coal and provide enough low carbon power to supply around 1 million homes

In July 2013 the Government gave approval for a 288 turbine offshore wind farm off the Lincolnshire and Norfolk coast, which will be capable of providing power to 820,000 homes.

In July 2013 the Government gave approval for a 99.9MW biomass power station at Blyth Harbour, Northumberland, which will be capable of providing power to 170,000 homes.

In March 2013 the Government gave approval for a 28 turbine wind power development at Brechfa Forest West, Carmarthenshire, which will be capable of providing power to 39,700 homes.

In February 2013 the Government gave approval for an extension at one of the first offshore wind farms built in the UK. Up to 17 new turbines will be added to Vattenfall's Kentish Flats offshore wind farm, which already hosts 30 turbines. Once extended it is estimated that the wind farm will be capable of providing power to an additional 35,000 homes.

2012

Carbon Capture and Storage (CCS)

In April 2012, the Government launched a new £1bn competition for CCS. At the same time a road map was published setting out the steps that the Government is talking to develop the industry.

Electricity

In September 2012 Ireland's first electricity link to Great Britain was officially opened. The EirGrid East West Interconnector runs between Deeside in North Wales and Woodland, County Meath in Ireland. Approximately 260km in length, the underground and undersea link has the capacity to transport 500 megawatts - enough energy to power 300,000 homes. The Interconnector will carry electricity both ways, benefiting consumers by helping to improve security of supply, increase competitiveness and to encourage the growth of renewable energy generation.

In July 2012, consent was given by the Government for the construction of two wind farms off the Norfolk Coast with a combined capacity of over 1GW. This means that 6.6GW of offshore wind power is now either operational, under construction or consented in the UK. The two wind farms at Race Bank (580MW) and Dudgeon (560MW) in the Greater Wash could generate enough electricity to power around 730,000 homes. The projects represent around £3bn of investment.

In May 2012, the Government gave consent to Vattenfall for the Pen Y Cymoedd project, a 299MW wind farm between Neath and Aberdare in South Wales. Made up of 76 turbines, it will have the highest generating capacity of any onshore wind farm in England and Wales, generating enough electricity to power up to 206,000 homes a year.

In March 2012, the Government gave consent to E.ON Climate and Renewables for a new biomass power station at Royal Portbury Dock in the Port of Bristol, North Somerset. The 150MW power station will be able to power up to 160,000 homes.

In February 2012, the world's oldest operating nuclear power station, Oldbury, near Bristol, finally stopped producing electricity, after 44 years of safe generation. Since it opened in 1967, Oldbury's twin reactors have generated 137.5 TWh of electricity, enough to power one million homes for over 20 years.

Energy Efficiency

A new EU Energy Efficiency Directive was introduced on 4 December 2012 with most of its provisions having to be implemented by Member States by 5 June 2014. The Directive establishes a common framework of measures for the promotion of energy efficiency within the EU in order to ensure the achievement of the EU's 2020 20 per cent headline target on energy efficiency and to pave the way for further energy efficiency improvements beyond that date. All EU-28 countries are required to use energy more efficiently at all stages of the energy chain – from the transformation of energy and its distribution to its final consumption. The new Directive will help remove barriers and overcome market failures that impede efficiency in the supply and use of energy and provides for the establishment of indicative national energy efficiency targets for 2020.

2012 (continued)

In September 2012 seven cities across England were awarded a share of £12m by the Government to help them kick-start the Green Deal in their regions. The cities - Birmingham, Bristol, Leeds, Manchester, Newcastle, Nottingham and Sheffield - put forward ambitious proposals to lower their carbon emissions and this funding will support their plans to test key elements of the Green Deal.

The secondary legislation underpinning the Green Deal and Energy Company Obligation was laid in Parliament in June 2012. Alongside this, DECC is publishing supporting guidance for participants in the Green Deal, such as a Code of Practice.

The legislation will begin to take effect over the summer, with the Energy Company Obligation in operation from October 2012. DECC has confirmed the Green Deal will be introduced through a controlled approach from October with full national systems testing to ensure consumer quality standards are embedded from the start.

Energy Policy

In November 2012, the Government introduced a package of energy measures, setting a clear and comprehensive framework for energy policy combined with substantial clarity on much of the detail investors need to continue investing in the UK's energy infrastructure.

The Energy Bill was introduced in Parliament, alongside a series of other key documents including the Annual Energy Statement, the Energy Security Strategy and a consultation on electricity demand reduction.

The Energy Bill will establish a legislative framework for delivering secure, affordable and low carbon electricity. It will put in place measures to attract the investment which is needed to replace current generating capacity and rising demand for electricity. In addition, the Bill contains measures to reform the electricity market to deliver secure, clean and affordable electricity, including:

- Contracts for Difference (CfDs) will stabilise revenues for investors in low-carbon electricity generation projects helping developers secure the large upfront capital investment required for low carbon infrastructure while protecting consumers from rising energy bills;
- A new company to be established to act as a single counterparty to the CfDs with eligible generators;
- Powers to introduce a Capacity Market, allowing for capacity auctions from 2014 for delivery of capacity in the winter of 2018/19, if needed, to help ensure the lights stay on even at times of peak demand;

An Emissions Performance Standard (EPS) which will curb the most polluting fossil fuel power stations.

2012 (continued)

In November 2012, the Government published the Energy Efficiency Strategy. The Strategy is aimed at changing the way energy is used in sectors such as housing, transport and manufacturing over the coming decades. It also includes immediate action to kick start a revolution in UK energy efficiency, including:

- £39 million to fund five centres examining business and household energy demand.
- An energy efficiency labelling trial with John Lewis.
- A drive on financing energy efficiency for business and the public sector.

In September 2012 the Government set out measures to help ensure that energy consumers are treated fairly and to make it easier for households get a better deal for their gas and electricity, including:

- New powers for Ofgem. Ofgem will be able to require companies who have breached licence conditions to compensate consumers who have lost out directly, rather than necessarily having to rely on a voluntary approach. Consumers will benefit directly instead of fines just going to the Treasury. The Government has already strengthened Ofgem's hand by making it harder for energy companies to block licence changes, and introducing tougher rules on the information suppliers have to provide to their customers.
- Help for prepayment meter customers in debt. The Government wants energy consumers wherever possible to be able to choose the best energy tariff for them. At the moment, prepayment meter customers who are more than £200 in debt to their energy supplier cannot switch to another company - which means they could be missing out cheaper deals elsewhere. Following a review by Ofgem, a voluntary agreement with suppliers means that this threshold will be raised to £500. From 1 November tens of thousands more households will be able to shop around for a better tariff and switch if they find a cheaper deal.
- Collective Switching Competition – a scheme where people can club together to get a better deal on their energy. 'Collective purchasing and switching' as it is known has the potential to help the most vulnerable households to save. A £5m competition for the most innovative local authority or third sector schemes is to be launched.
- Better billing. Energy bills are rising, but fewer people than ever seem to be shopping around and switching to a better deal. The Government is working with Ofgem to ensure that consumers have clear information on their bills about the supplier's cheapest tariff and the savings consumers could make by switching. The Government is also working with suppliers to get better information for consumers, including the possibility of putting Quick Response (QR) codes on energy bills/annual statements to make it possible to switch through mobile phones.

2012 (continued)

- An independent suppliers summit. 99 per cent of domestic households are customers of only six main energy suppliers. The Government wants to see more competition in the market, with companies working harder to win and then keep consumers' business. Building on the work the Government has already carried out to reduce barriers to entry and growth, a summit with independent suppliers will explore what more can be done.

A new Energy Bill was announced in the Queen's speech in May 2012. The purpose of the Bill is to reform the electricity market to enable large-scale investment in low-carbon generation capacity in the UK and deliver security of supply, in a cost-effective way.

Feed in Tariffs
At the start of April 2012, changes were made to the feed in tariffs for small scale solar PV installations. This followed a consultation process and subsequent legal challenges.

Further changes, following a consultation process, to solar PV tariffs and a PV tariff degression mechanism, came into effect in August 2012, whilst further tariff changes and degression for all other technologies as well as scheme administration issues came into effect in December 2012.

Fuel Poverty
A new way to measure fuel poverty in England was proposed by the Government in September 2012, following the independent review on this issue by Professor John Hills of the London School of Economics (LSE).

The proposal is to adopt a new definition based on the overall framework suggested by Hills in his review. The new definition includes dual indicators separating the extent of the issue (the number of people affected) from its depth (how badly people are affected) as a way to measure the problem.

Ensuring more accurate measurement will help to design effective solutions to fuel poverty, allowing the resources available to be targeted where they are needed most.

The Government is currently considering the responses to this consultation.

An independent report, by Professor John Hills of the London School of Economics, was published in March 2012, which advised the government how it could best tackle the problem of fuel poverty. Professor Hills started his research in March 2011 and looked at the definition of fuel poverty, targets, and the effectiveness of different policy interventions. Recommendations included in the report are:

- Professor Hills is clear that fuel poverty is currently measured in a way that is both flawed and unhelpful;

- Professor Hills has proposed a new way to define fuel poverty, separating the extent of the issue (the number of people affected) from its depth (how badly people are affected);

Professor Hills also shows how the impact of Government policies can be assessed against this new proposed definition, showing the positive impact current Government policies are having on tackling fuel poverty.

2012 (continued)

Oil and Gas

In December 2012, the Government announced that exploratory hydraulic fracturing (fracking) for shale gas could resume in the UK, subject to new controls to mitigate the risks of seismic activity.

In December 2012, the Government confirmed gas will continue to play an important role in the energy supply mix. The Gas Generation Strategy sets out a number of steps that will be taken to stimulate investment in gas generation. New gas-fired power stations (which emit half the CO2 of coal) will need to be built over the next two decades to replace retiring coal, older gas and nuclear power stations. The Strategy also confirms the Government's commitment to supporting the development and commercialisation of Carbon Capture and Storage (CCS) technology, which will help to decarbonise gas, as well as coal, in future.

In November 2012 the Government gave Chevron North Sea Ltd consent to drill the deepwater Cambo-5 well, West of the Shetland Isles.

In October 2012 the Government gave Shell consent for a new oil and gas development that will add two per cent to UK daily production. The Fram field, off the East Coast of Scotland, is one of the biggest developments to be given the go ahead in the past five years. Once production starts, the field is expected to recover an average of 35,000 barrels of oil equivalent per day.

In May 2012 it was announced that the Coryton refinery would close due to the refinery's administrators having failed to find a buyer. The refinery will now be turned into a diesel import terminal by Vopak, Shell and Greenergy; initially it will have a capacity of 500,000 cubic metres (18,000,000 cu ft).

In May 2012, Total announced that the gas leak from the Elgin platform that started on the 25th March 2012 had been stopped. A dynamic kill operation successfully used heavy mud to stem the flow of gas from the gas well.

In May 2012, the Government announced that the latest North Sea licensing round for oil and gas drilling has broken all previous records for the number of applications received by the Government. A total of 224 applications were submitted for the 27th Licensing Round covering 418 blocks of the UK Continental Shelf. It is the largest number since offshore licensing began in 1964 and is 37 more than the previous high total received in the last licensing round.

In March 2012, the Government gave BP consent to drill the deepwater North Uist well, northwest of the Shetland Islands.

Renewable Heat

In March 2012 the Government announced further support for the domestic sector under a second phase of the Renewable Heat Premium Payment Scheme (RHPP).

Renewables

In October 2012, the Government gave consent to a new 19 turbine/57 MW wind farm near Frodsham, Cheshire with the potential to generate enough power to supply the equivalent of 25,000 homes.

In October 2012, the Government gave consent to the construction of a 60MW energy from waste generating station at Lostock in Cheshire, which will generate enough power to supply 80,000 homes.

2012 (continued)

Smart Meters

In April 2012, the Government published its responses to consultations on the licence conditions and technical specifications for the roll-out of gas and electricity smart metering equipment, and on licence conditions for a code of practice for the installation of smart meters. At the same time, it published consultations on a consumer engagement strategy, data access and privacy, the Smart Energy Code, and elements of the regulatory framework for the Data and Communications Company. It also published its conclusions relating to the Smart Metering Equipment Technical Specifications and notified these to the European Commission, as required under the Technical Standards Directive.

For major events in earlier years see the DECC website version of this annex at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

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Notes

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DIGEST OF UNITED KINGDOM ENERGY STATISTICS 2014

Energy is a major natural resource and a key factor in the economy and environment of the United Kingdom. Data on energy supply and demand, energy prices and values and trade in energy are vital components of this country's main economic and environmental indicators.

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